Per Check
NOV - 8 1954

96th year

AMERICAN

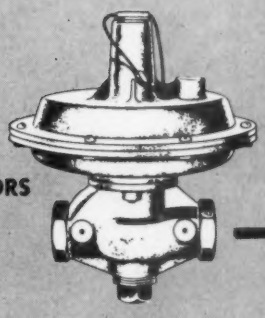
OCTOBER 1, 19

Vol. 181—No. 4

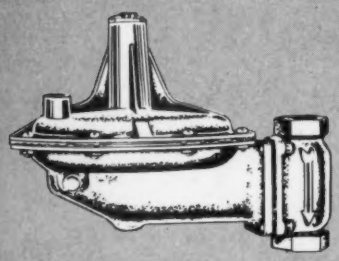
Gas Journal

modern gas control

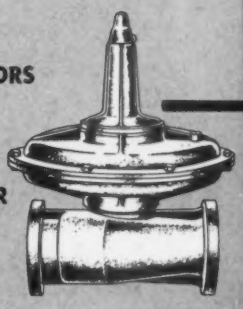
by Reynolds



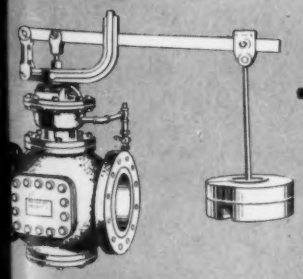
LOW PRESSURE REGULATORS



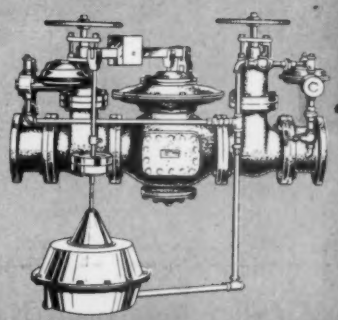
HIGH PRESSURE SERVICE REGULATORS



INDUSTRIAL REGULATOR



EW HIGH PRESSURE
LINE REGULATOR



DISTRICT STATION REGULATOR

Today—you need, and are entitled to, good, reliable service from your Gas Control Equipment. Reynolds Regulators give you good service today just as they have for more than six decades.

For more than sixty-two years—in design—in engineering—Reynolds has held the lead in the development of Gas Control Equipment.

Reynolds will gladly work with you to determine what regulator or combination of regulators will give you the ultimate in Gas Control.

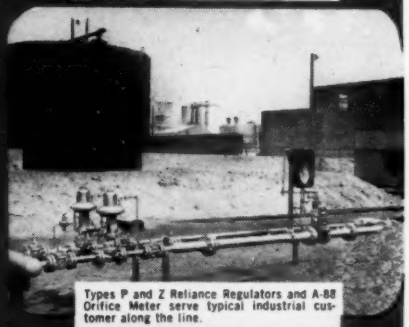
GAS CONTROL Since 1892

REYNOLDS GAS REGULATOR

ANDERSON, INDIANA, U. S. A.

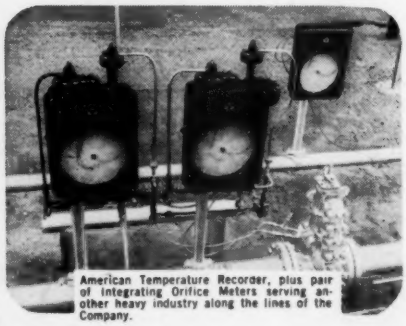
SCENES ALONG THE 3-STATE COMPANY ROUTE SERVED 100% BY AMERICAN EQUIPMENT

Type P and Type Z Reliance Regulators, plus 100" and 10" A-88 Integrating Orifice Meters at Henderson, Nevada Border Station. Working pressures average 420 psi and 27,000,000 cu. ft. daily capacity.



Types P and Z Reliance Regulators and A-88 Orifice Meter serve typical industrial customer along the line.

Close-up view of Dual Integrating meters and manifold needle valves at another user's plant. Meters are 100" and 10", connected in duplex.

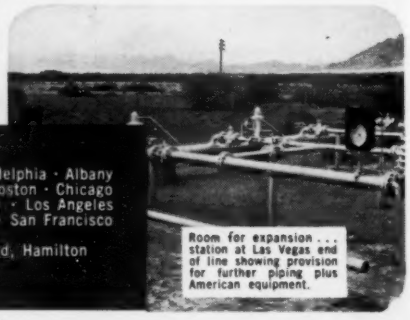


American Temperature Recorder, plus pair of Integrating Orifice Meters serving another heavy industry along the lines of the Company.

NEVADA NATURAL GAS PIPE LINE COMPANY 100% AMERICAN® EQUIPPED

Spanning 117 miles of desert terrain, crossing the Colorado River en route, the lines of Nevada Gas Pipe Line Company reach from Topock, Arizona to Whitney, Nevada. Every foot of the line as it spans parts of three states is served by American measurement and regulation equipment. And ultimate consumers, both industrial and residential, are served by American Meters as well.

American Meter Company is proud of the part it has played in this $2,000,000 plus development that brings better natural gas service to a fast-growing industrial and residential area. Here—as in many similar projects across the country—American equipment brings dependability, accuracy and safety to gas suppliers and customers, just as it has done for nearly 120 years.



Room for expansion . . . station at Las Vegas end of line showing provision for further piping plus American equipment.

AMERICAN® METER COMPANY

GENERAL SALES OFFICE, 1513 Race Street, Philadelphia · Albany · Alhambra · Atlanta · Baltimore · Birmingham · Boston · Chicago · Dallas · Denver · Erie · Houston · Kansas City · Los Angeles · Minneapolis · New York · Omaha · Pittsburgh · San Francisco · Seattle · Tulsa

IN CANADA: Canadian Meter Company, Limited, Hamilton · Edmonton · Calgary

NOV -8 1954

When you plan your water seal gas holder, REMEMBER:

Koppers bid is based on 76 years of experience

IN 1876, the Bartlett-Hayward Company, now part of Koppers, designed and built its first water seal gas holder. That holder is still in operation—a testimonial to the sound engineering that forms the basis of Koppers Water Seal Gas Holders. During these past 76 years, over 600 of these holders have been built from coast to coast, with constant improvement in design as experience and engineering advances have developed. Today, a Koppers proposal carries with it the assurance that your holder will be built to the same high standards that have made Koppers reputation over the years.

QUALITY CONSTRUCTION

Koppers has the experience and facilities to build water seal gas holders from 10,000 to 15,000,000 cubic feet capacity under one contract. And, whatever the size, Koppers construction methods are designed to guarantee the quality of the work. All seams, plates, and panels are continuously welded inside and out. For additional strength, vertical panels are reinforced with vertical legs. Every stage of construction is tested for accuracy in operation . . . and the entire job is engineered for dependable low-cost service *under your local conditions.*

For minimum maintenance and long life . . . for a better-built gas holder, remember that Koppers engineering is based on 76 years of water seal gas holder experience. For additional detailed and technical information, write: KOPPERS COMPANY, INC., Gas Apparatus Dept., Metal Products Division, 211 Scott St., Baltimore 3, Maryland.

Engineered Products
Sold with *Service*

KOPPERS ®

GAS APPARATUS

METAL PRODUCTS DIVISION • KOPPERS COMPANY, INC., BALTIMORE 3, MD.

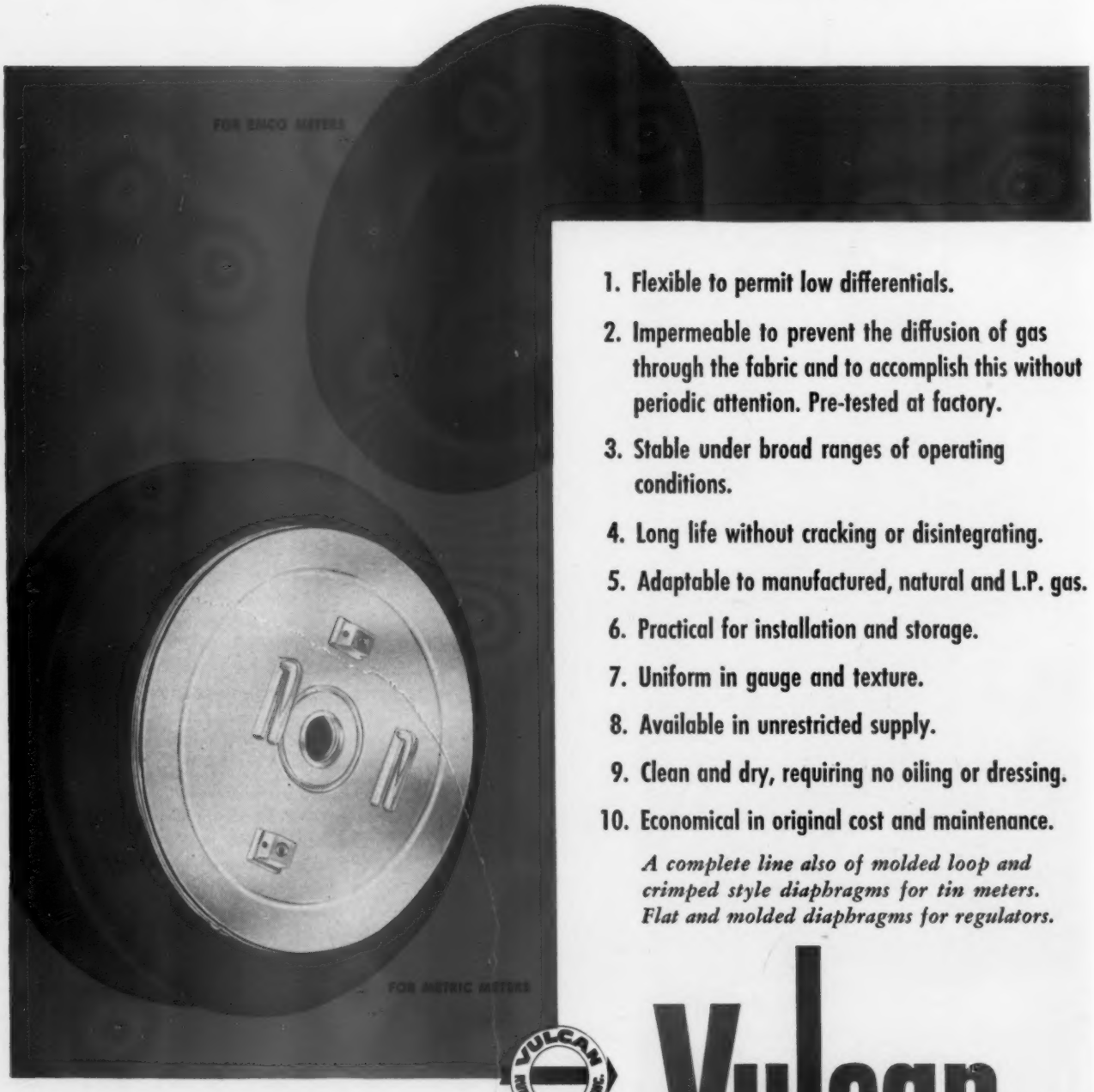
This Koppers Division also supplies industry with Fast's Couplings, American Hammered Industrial Piston and Sealing Rings, Koppers-Elex Electrostatic Precipitators and Aeromaster Fans.

AMERICAN GAS JOURNAL, October 1, 1954. Vol. 181, No. 4. Published monthly (except October, then semi-monthly), by American Gas Journal Inc., at 73 Main Street, Brattleboro, Vt. Entered as second class matter January 24, 1950, at the post office at Brattleboro, Vt. under Act of March 3, 1879. Executive and editorial offices at 205 East 42nd St., New York 17, New York. Subscription prices, U.S. $3 per year; Canada $4; Foreign $10. Single copies 50 cents, except October 1 issue, which is not sold separately. Printed in U.S.A.

10 Reasons For Specifying

VULCAN MOLDED SYNTHETIC DIAPHRAGMS

for Emco and Metric Meters



1. Flexible to permit low differentials.
2. Impermeable to prevent the diffusion of gas through the fabric and to accomplish this without periodic attention. Pre-tested at factory.
3. Stable under broad ranges of operating conditions.
4. Long life without cracking or disintegrating.
5. Adaptable to manufactured, natural and L.P. gas.
6. Practical for installation and storage.
7. Uniform in gauge and texture.
8. Available in unrestricted supply.
9. Clean and dry, requiring no oiling or dressing.
10. Economical in original cost and maintenance.

A complete line also of molded loop and crimped style diaphragms for tin meters. Flat and molded diaphragms for regulators.

VULCAN RUBBER PRODUCTS, INC.
54 Worth Street, New York 13, N. Y.
Manufacturer of Vulcan-Duroflex products
A subsidiary of Reeves Brothers, Inc.

VULCAN RUBBER PRODUCTS INC.

Vulcan
SYNTHETIC DIAPHRAGMS

AMERICAN Gas Journal
96TH YEAR OF PUBLICATION

VOLUME 181 | OCTOBER 1, 1954 | NUMBER 4

This month...

C'mon—everybody—
A long and loud cheer for Buck Eacker!
Again—everybody—
A long and loud cheer for Sheldon Coleman!

More than just association tit'e-holders, Buck and Sheldon have given the gas industry distinguished, unselfish, vigorous and farsighted administrations—for that, they both have the industry's gratitude.

Seriously-minded association presidents must sacrifice time that they *should* be devoting to their companies' business—if they are to do what is expected of them as association presidents. We suspect that these 2 presidents have done a bit of nights-and-weekends work to keep up-to-date with their own companies. They have been unstinting in time they have devoted to representing AGA and GAMA, respectively, throughout the country during their year in office.

Trite as it may seem, it is with a sincerity that stems from direct observations that we summarize with . . . *Buck and Sheldon, nice jobs!*

But—that's not all. Our own appreciation for a year-well-done, extends most emphatically to the very gracious and attractive Mrs. Eacker and most emphatically to the very gracious and attractive Mrs. Coleman. They strengthened the teamwork, indubitably.

• • •

Utilization of gas for industrial processing continues as a top-interest of the GAS JOURNAL, with an article describing the results obtained with high-temperature, high-speed equipment in a Texas pipe mill. Page 16.

• • •

A Florida gas company, plagued with cost considerations, solved some of its problems with reforming equipment that is described in a feature article. Page 14.

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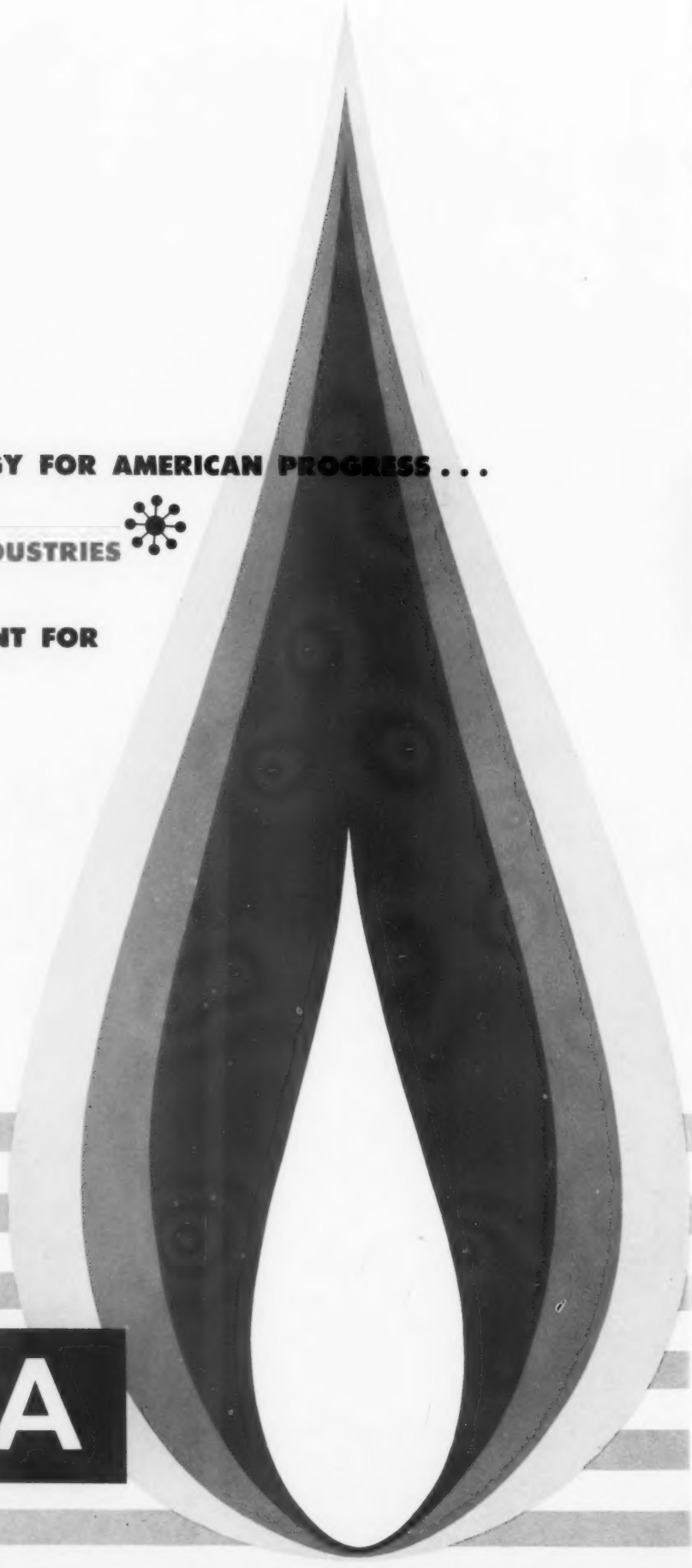
GAS ... BASIC ENERGY FOR AMERICAN PROGRESS ...

DRESSER INDUSTRIES

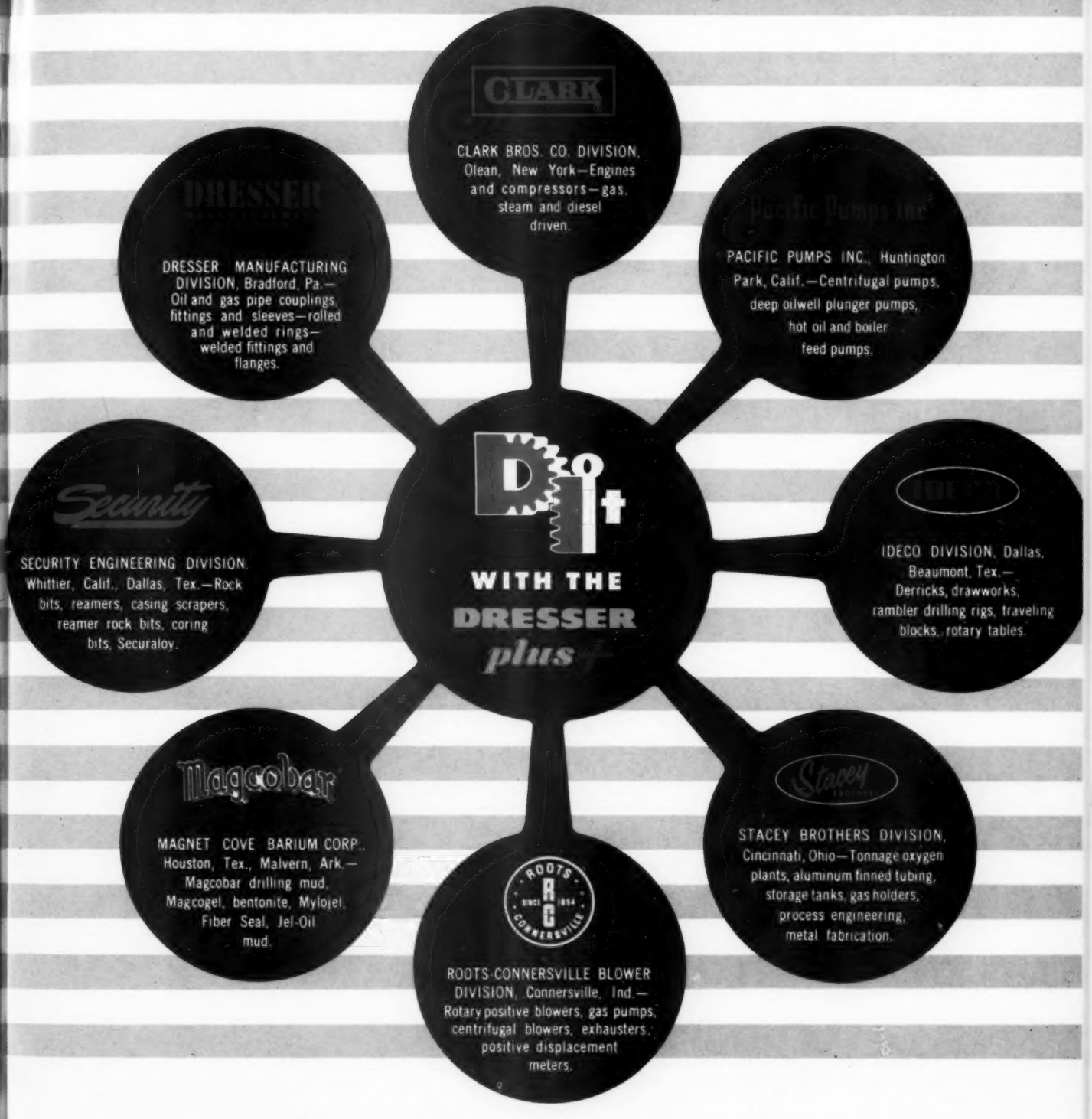
... BASIC EQUIPMENT FOR

GAS ENERGY



Greetings—

AGA


CLARK
CLARK BROS. CO. DIVISION, Olean, New York—Engines and compressors—gas, steam and diesel driven.
DRESSER
DRESSER MANUFACTURING DIVISION, Bradford, Pa.—Oil and gas pipe couplings, fittings and sleeves—rolled and welded rings—welded fittings and flanges.
Pacific Pumps Inc.
PACIFIC PUMPS INC., Huntington Park, Calif.—Centrifugal pumps, deep oilwell plunger pumps, hot oil and boiler feed pumps.
Security
SECURITY ENGINEERING DIVISION, Whittier, Calif., Dallas, Tex.—Rock bits, reamers, casing scrapers, reamer rock bits, coring bits, Securaloy.
D t
WITH THE
DRESSER
plus +
IDECO
IDECO DIVISION, Dallas, Beaumont, Tex.—Derricks, drawworks, rambler drilling rigs, traveling blocks, rotary tables.
Magcobar
MAGNET COVE BARIUM CORP., Houston, Tex., Malvern, Ark.—Magcobar drilling mud, Magcogel, bentonite, Mylojel, Fiber Seal, Jel-Oil mud.
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CONNERSVILLE
ROOTS-CONNERSVILLE BLOWER DIVISION, Connersville, Ind.—Rotary positive blowers, gas pumps, centrifugal blowers, exhausters, positive displacement meters.
Stacey
STACEY BROTHERS DIVISION, Cincinnati, Ohio—Tonnage oxygen plants, aluminum finned tubing, storage tanks, gas holders, process engineering, metal fabrication.

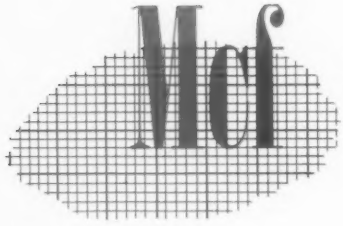
Use any Dresser product and put the DRESSER *plus* + to work for you!

Every day, natural gas plays an increasingly important part in providing the basic energy for this nation's unequalled industrial potential. And the companies that make up Dresser Industries continue to provide more and more of the basic equipment used by the great natural gas industry in the unfailing performance of its responsibilities as a public servant. In every phase of the gas industry – from drilling to distribution – the Dresser companies work together to supply these equipment needs.

When you use any Dresser product, you get an important added value . . . the DRESSER PLUS + . . . the coordinated research and combined engineering talent of all the Dresser companies directed toward one goal: to make certain that every Dresser product continues to be *a standard of comparison the world over.*

DRESSER INDUSTRIES, INC.
OIL, GAS AND CHEMICAL EQUIPMENT

ATLANTIC BUILDING • DALLAS, TEXAS



RESEARCH for military purposes usually brings about either new or improved civilian products. Temperature research can be expected to follow that pattern. We now hear about developmental research in the area of 5,500 F and basic research with objectives as high as 45,000 F.

MATERIALS are key to temperature research. New materials—ceramics, metals and blends of both—are under investigation for application to jet propulsion mechanisms. Those materials certainly will be applied to future high-temperature industrial gas equipment by development-minded manufacturers.

PACIFIC Northwest Pipeline Corp. and its yet-to-be-named-publicly associates could not possibly find any aid and comfort in C. H. Gueffroy's recent *restatement* to group of Northwest bankers that Portland Gas will buy natural gas *only* on a measured demand basis and *only* at rates that compare favorably with Portland's present manufactured gas costs.

CHEERS for Dennis K. Yorath's declaration of independence for Canadian Gas Association during recent convention. Breaking what he described as cosy tie of CGA and American Gas Association, Mr. Yorath said Canadians must convert their association to full time, efficient body that can assist, advise and act on behalf of Canadian gas industry. "We must," he said, "speak to Canada for the industry with our own voice."

LEAK detection moves into the ultra-ultra-sensitive areas of industrial operation with new device capable of detecting 1 part of helium in 2,000,000 parts of air.

FLIPOVER from usual technique of whacking utilities appeared in one California newspaper referring to taxes paid by Pacific Gas and Electric Co. "It makes us shudder," says editorial writer, "to think what a tailspin Marin county's finances would be in if its $500,000 in PGandE's taxes were not forthcoming because the utility was publicly owned." PGandE picks up 63% of county's total tax bill.

COMBINATION utility due for big whoop-and-holler is Public Service Electric & Gas in New Jersey after recent realistic approach to dealer meetings. Series of meetings featured range demonstrations—following Gas Appliance Manufacturers Association's quickie-demos—as more effective than speeches for getting behind Old Stove Round-Up.

PERPETUAL boom is impossible, says Guaranty Trust Company of New York. To accomplish the impossible, inflation must be resorted to as a substitute for needed readjustments. Insidious danger, the bank says, is that it might seem to work for a time. Inherent weaknesses and destructive effects of government-increased money supply might not come to light for years, if policy is pursued with subtlety and restraint.

EVIDENCE is on hand, Guaranty Trust says, suggesting that business tempo has quickened since Labor Day. Too early to be absolutely sure. Too early to guess how improvement compares with normal seasonal trends.

SITUATION in business currently summed by one economist: he wants to get off fence with firm prediction; doesn't know which side of fence he should come down.

DOLLARS seem plentiful, according to bank reports. Idle dough now running around $1-billion. Federal Reserve can double that just by buying government securities it sold to banks in recent weeks.

TURNAROUND for Texas Eastern Transmission Corp., in intervention by American Pipe Line Corp., when TETCO proposed to put Little Inch line back in oil service. Even dull memories recall interventions that piled up against both inchers when proposed conversion was oil-to-gas.

COSTS incident to highway construction are subject of approved questionnaire to utilities from U. S. Bureau of Public Roads. It's part of study-and-report on need for recompensing utilities in facilities-relocation work.

HOMEBUILDING continues in upswing. Experts look toward year-end with figure for dwelling units that will be second only to 1950.

CONSTRUCTION of all kinds, says F. W. Dodge Corp., is almost 19% above same point of 1953.

PUBLICITY in the gas industry is probably neither worse nor better than publicity throughout all-industry—we just see more of it. That gives rise to thought that we're often inclined to rewrite some inept, ineffective, unattractive stuff tied to some firms associated with gas industry—just before dropping it into an amply-sized final depository.

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MUELLER®

WORK SAFELY

USE NO-BLO FITTINGS

Patented

A complete line of No-Blo Fittings permit practically all distribution operations to be performed quickly and safely, under pressure, without loss of gas.

The "heart" of the No-Blo Method is an exclusive inner plug, stem or valve that may be installed or removed through a valve, under pressure. For example, the No-Blo Service Tee shown is welded to the main and the service line completed. Next, a control chamber or gate valve is attached to the top of the tee, a drilling machine is attached and the main drilled. This puts the service in operation. The valve is then closed, the drilling machine removed and the drill replaced by the plug.

NO-BLO

After remounting the drilling machine and opening the valve, the plug is screwed securely into the top of the tee. The drilling machine and valve may now be removed — without escape of gas. A completion cap "buttons up" the fitting and provides a positive double seal.

This same basic procedure is used with other No-Blo Fittings to make service connections, connect temporary lines, stop off mains and service lines for repair or replacement, extend lines, install stops and a myriad of other operations.

Ask your Mueller Representative about the full line of No-Blo Fittings and how they can solve your distribution and maintenance problems.

MUELLER CO.

Dependable Since 1857

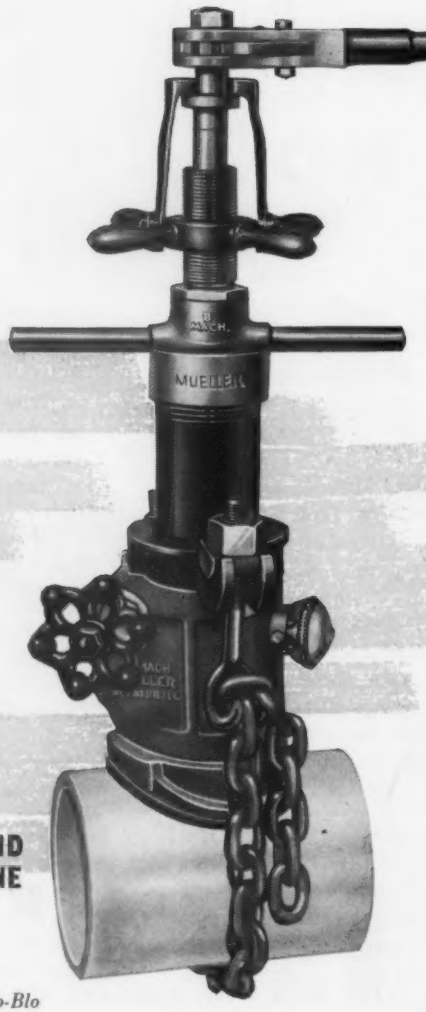
MAIN OFFICE & FACTORY DECATUR, ILLINOIS

MUELLER® NO-BLO Method

ASSURES SAFE SERVICE

without welding . . .

"A-2" DRILLING, TAPPING AND INSERTING MACHINE



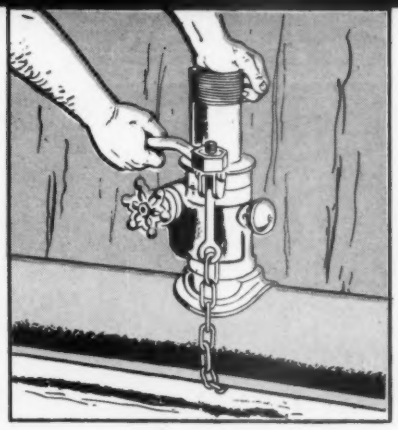
"B" DRILLING, TAPPING AND INSERTING MACHINE

MACHINE-INSERTED VALVE TEE

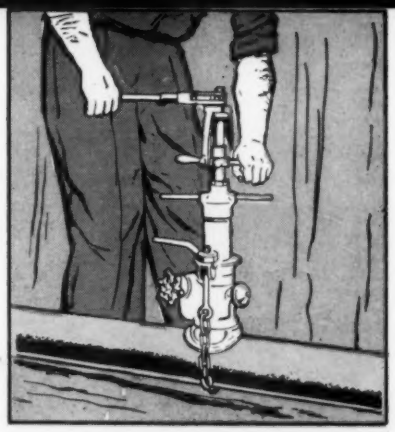
No-Blo Machine-Inserted Valve Tees—used to make service connections by inserting in steel, wrought iron or cast iron pipe, under pressure, and without welding. Special ¾" I.P. Compression Joint inlet with ¾" inside I.P., ¾" fillet weld or 1" butt weld outlet.

This is another of a series showing the broad applications of No-Blo Fittings and the machines used for their installation.

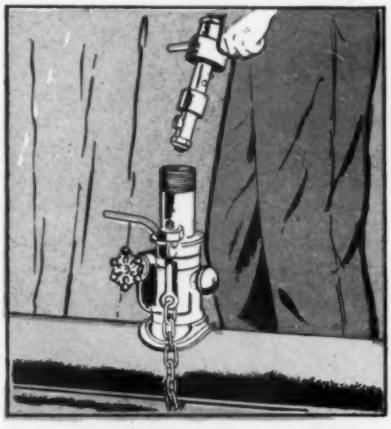
STEP 1.
ATTACH!
CLEAN MAIN AND POSITION SADDLE AND GASKETS. MOUNT MACHINE BODY ON SADDLE AND ATTACH SECURELY TO MAIN WITH CHAIN.



STEP 2.
DRILL AND TAP!
ATTACH COMBINED DRILL AND TAP. DRILL AND TAP MAIN. RETRACT BAR, CLOSE BUILT-IN FLOP VALVE. RELIEVE PRESSURE ABOVE VALVE. REMOVE BORING BAR ASSEMBLY.



STEP 3.
INSERT!
ATTACH "E-Z" RELEASE SCREW PLUG AND TEE TO BORING BAR, (VALVE CLOSED), REMOUNT, EQUALIZE PRESSURE, OPEN FLOP VALVE AND SCREW TEE INTO MAIN. RELEASE SCREW PLUG. REMOVE MACHINE.



STEP 4.
TIGHTEN!
BRUSH CHIPS FROM BASE OF TEE, AND TIGHTEN. TIGHTEN COPPER ENCASED NEOPRENE COMPRESSION NUT FOR PERMANENT, LEAK-PROOF SEAL.

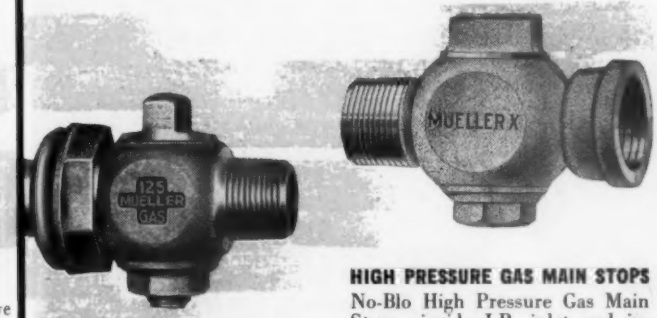
STEP 5.
CONNECT!
CONNECT SERVICE LINE TO TEE. OPEN BUILT-IN VALVE OF TEE TO PUT LINE INTO OPERATION. ATTACH COMPLETION CAP. TEST. CONNECTION IS COMPLETE.

CONNECTIONS...

...without loss of gas

Mueller "B" and "A-2" Machines readily drill, tap and insert Valve Tees and Gas Main Stops into steel, wrought or cast iron mains for fast, permanent connections. No welding necessary! Both machines are simple and rugged in design. Used on pressures to 90 psi; with power clevis to 230 psi. "B" Machine used for machine-inserted valve tee and stops through 1" and pipe plugs through 2½". "A-2" used for tees and stops through 2" and pipe plugs through 4".

For additional information on the "B" and "A-2" and related No-Blo Fittings, consult your Mueller Representative or write direct.



HIGH PRESSURE GAS MAIN STOPS
No-Blo High Pressure Gas Main Stops—inside I.P. inlet and inside or outside I.P. outlet—are used to make service connections by inserting directly into main or by using a service clamp. Sizes ½" through 2".

CHINE-INSERTED GAS MAIN OPS
- Blo Machine - Inserted Gas in Stops—Compression Joint et, outside I.P. outlet—are d for service connections in same manner as Machine-erted Valve Tees. No welding any kind necessary to com-te installation. Size ¾" only.

MUELLER CO.
Dependable Since 1857
MAIN OFFICE & FACTORY DECATUR, ILLINOIS

With 100 years

Courtesy, Mobile Chamber of Commerce

This is Mobile, Alabama, known as the "City of Six Flags"

Bettmann Archive

This is Mobile as it looked shortly before Mobile Gas Service Corp. was founded over a century ago.

MODERNIZED cast iron

of EXPERIENCE...
they must be right

MOBILE...installed cast iron gas mains 100 years ago... and installs them today!

Mobile, Alabama, gives due credit for its growth in population and industrial expansion to the progressive management of Mobile Gas Service Corp. A century ago, when the first cast iron distribution mains were laid, the population was about 30,000. Today, 405 miles of mains are required to service Mobile's quarter-million population. Nearly all are cast iron mains *(see cut)*.

A customer who buys your product year after year—generation after generation—is a "jewel beyond price". Be you merchant or manufacturer, you might count such customers on the fingers of your two hands. Yet, the cast iron pressure pipe industry can count more than 60 of them — utilities that have been buying cast iron pipe for water or gas mains (or both) for 100 years.

Today's *modernized* cast iron pipe—centrifugally cast and with standardized mechanical joints—is even more economical and efficient. The pipe is stronger, tougher, more uniform in quality. The mechanical joints are bottle-tight for usual gas pressures and for all types of gas.

Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, 122 So. Michigan Avenue, Chicago 3, Ill.

CAST Q IRON

The Q-Check stencilled on pipe is the Registered Service Mark of the Cast Iron Pipe Research Association.

In good condition after 100 years of service, this cast iron distribution main is still functioning in Mobile, Ala.

pipe FOR MODERN GAS DISTRIBUTION

CONCENTRIC CATALYTIC GENERATOR

AS STANDBY FOR NATURAL GAS

Reformed propane or oil gas enriched to 1,000 Btu/cf has gravity 0.74 and represents higher percentage of substitution to natural gas (gravity 0.6) than propane-air (gravity 1.2) . . . lower fuel costs when heating with heavy oil.

FEATURES

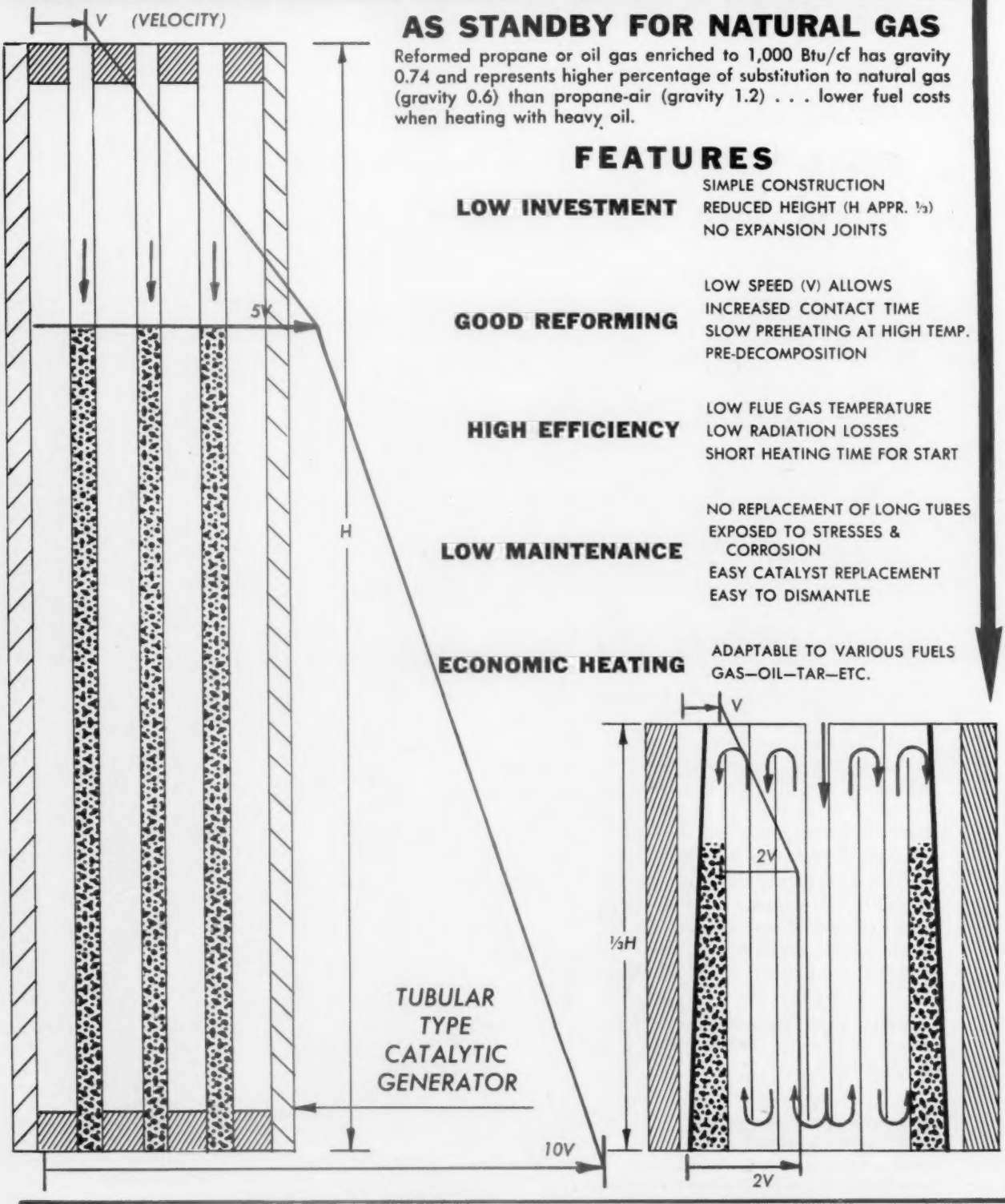
LOW INVESTMENT
SIMPLE CONSTRUCTION
REDUCED HEIGHT (H APPR. ⅓)
NO EXPANSION JOINTS

GOOD REFORMING
LOW SPEED (V) ALLOWS
INCREASED CONTACT TIME
SLOW PREHEATING AT HIGH TEMP.
PRE-DECOMPOSITION

HIGH EFFICIENCY
LOW FLUE GAS TEMPERATURE
LOW RADIATION LOSSES
SHORT HEATING TIME FOR START

LOW MAINTENANCE
NO REPLACEMENT OF LONG TUBES EXPOSED TO STRESSES & CORROSION
EASY CATALYST REPLACEMENT
EASY TO DISMANTLE

ECONOMIC HEATING
ADAPTABLE TO VARIOUS FUELS
GAS—OIL—TAR—ETC.



NORTH AMERICAN UTILITY & CONSTRUCTION CORP.

CHRYSLER BUILDING NEW YORK 17, N. Y.

Editorial:

No Laughing Matter

DEVELOPMENTS by science and industry are never less than exciting to those of us who are willing to learn about them and then think about their immediate applications and extended possibilities for the future. Most modern developments have sharply marked effects on the dimensions of time, space and economics . . . hours become seconds; great bulk becomes microscopic; costs are fractionated. Now, only the impossible requires significant time for accomplishment.

In a period of extremely rapid technological development, such as the one in which we live and work, obsolescence also advances at an ever-increasing rate and, therefore, early visualizations enlarge and time requirements for accomplishment telescope.

Atomic energy in electric generation is just such a case. Certainly, we do not and hope no one else decries this earlier-than-forecast development. But, as part of the gas industry, we regard it as no laughing matter.

Hard on the heels of the highly-publicized 60,000kw Duquesne atomic reactor plant in Pennsylvania, comes a group of New Englanders with a broad approach.

Yankee Atomic Electric Co. is the name of the group. Its purpose: "to explore the economic and practical aspects of this type of electric generation." But, it is clear this is no mere study group; it's commercial and can be expected to proceed, in an exploratory manner, directly to its objective: *atomic electricity for New England*. This is not dream-stuff or a publicity stunt. It's big business and on the way.

What is Yankee Atomic? The company includes 11 utilities that account for about 90% of New England's electric output. The president, William Webster, is executive vice president, New England Electric System. Irwin L. Moore, a Yankee director, is president of NEES.

Other companies in Yankee Atomic are Boston Edison, Connecticut Light & Power, Hartford Electric, Connecticut Power, Western Massachusetts Electric, New England Gas & Electric, Central Vermont Public Service, Public Service of New Hampshire, Central Maine Power and Eastern Utilities Associates.

Mr. Webster's publicly-stated view is that it may take several years of experimenting before decisions are made on atomic electricity for New England. But, he must know nuclear research is moving at a rate that obviates such conservatism.

Costs? Currently high, yes, but . . . research has already tumbled costs. Some point out that few electric rates are as high as ½¢ per kwh; there are rates under ¼¢; and no present atomic reactors will produce ½¢ electricity. Head-in-sand stuff!

In face of needling by Atomic Energy Commission's reactor development division, industry is bound to come up with cheaper and ever-more efficient equipment—with effectively-competitive rates as the real goal.

There is no reason to believe that Yankee Atomic will have to wait long for vast reactor improvements; it should have no difficulties in assembling the initial $1-million for plant. The project's financing is approved by Massachusetts Department of Public Utilities.

There are few details, now. Obviously, the contemplated centralized plant would produce power for sale throughout New England to investing utilities, which would distribute it for residential, industrial and commercial utilization.

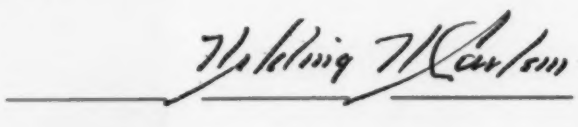
It seems appropriate to assume highly-competitive rates due to lowered basic energy cost and elimination of individual utility plant operations.

The New England gas industry has an atomic cloud —one that will not disperse—directly overhead. And, there will be counterparts of this regional Yankee plan. Certainly, one may be expected to bloom in the Pacific Northwest.

If there is substantial agreement, stemming from experience and accepted principle, that technological progress will not be blocked, then the gas industry must visualize, plan and activate its own answer to nationwide atomic electric generation.

That answer will come only from new, daring, coordinated and fully-financed research . . . in, for and by every branch of the industry—from new and completely realistic viewpoints and decisions at the highest levels of management . . . in every branch of the industry—from new determination to assure gas industry survival, not through the next 5-or-10 "personalized years," but throughout the foreseeable future.

New dimensions in gas industry courage and gas industry leadership will be essential to achieve that new success.



How Florida Gas Company Solved Some Cost Problems

by **R. L. Hasche**
Hasche Engineering Company

and **G. L. Fleming**
Koppers Company, Inc.

SOARING prices of raw materials and a tight and highly competitive labor market are prime factors facing all gas companies today. In addition, the high cost of plant expansion and the fight to keep gas rates competitive beset all manufactured gas companies in their effort to meet growing demands. All natural gas companies need a low-cost method for producing peak load or standby gas to eliminate wholly, or in part, their interruptible gas contracts.

One company, located in the heart of the Florida citrus area, has found the answer to these problems by utilizing the Hasche process. Use of this process allows them to offer their customers the same close chemical control of their product that is attained by companies distributing natural gas. It permits this company to realize substantial savings in labor and other operating costs, and thus enables it to continue to meet local competition.

Not only was this plant's capacity doubled with just a small investment, the capacity of its distribution system was likewise expanded without any additional cost, due to a 25% increase in the heat content of the gas distributed.

This company, Central Florida Gas Corp., supplies the communities of Winter Haven, Eagle Lake, Bartow, Haines City, Lake Hamilton, Dundee, Mountain Lake and Lake Wales with reformed propane from its Winter Haven plant. See map in Figure 1.

A modern, aggressive management characterizes Central Florida, and its progressive sales policy was recognized in 1953 when it was named winner in its class for commercial sales in the annual American Gas Association commercial gas cooking sales campaign. It also was a winner in the refrigerator sales campaign sponsored by Servel, Inc., and AGA.

In June 1953, Central Florida installed a Hasche Reformer to convert propane to an interchangeable gas with the 525 Btu carburetted water gas which they were

Figure 1—SERVICE AREA of Central Florida Gas Corp.

manufacturing at that time. Since then, they have been distributing, with excellent results, reformed propane with a heat content of 656 Btu. The reformer they installed is the culmination of 20 years of development in the field of hydrocarbon reforming by Dr. R. L. Hasche.

At the beginning of 1950, Central Florida was plagued with rising costs of labor and raw materials; they were reaching peak demands that taxed the capacity of their carburetted water gas sets during cold snaps. Peak loads in this area are sometimes in the ratio of 6-to-1.

In an effort to resolve these problems the carburetted water gas sets had been changed through the years from coke and distillate operation to coal and residual oil operation. And, in an effort to further reduce manufacturing costs, the company had even gone into the business of picking up spent drain oil from filling stations in their operating area for use as carburetting oil.

In spite of considerable savings effected by the foregoing economies, the mounting labor-cost problem continued to harass the company. After careful consideration of further possible solutions to the company's problems, the Hasche process of reforming propane gas was chosen as the most feasible and practical method to:

1. combat the rising labor costs;
2. increase production capacity with a minimum of capital outlay;
3. reduce, if possible, the present holder cost of gas.

Therefore, a 1 MMcf/day Hasche reformer was installed in June, 1953. The reformer was pre-assembled and shipped by truck to Winter Haven, where Hasche tile was installed. The only additional field work required was the connection of the feed and reformed gas piping.

Central Florida's plant is located on the shores of Lake Shipp, surrounded by beautiful homes, and it does not detract from the beauty and neatness of the surroundings.

Operation of process

Facilities have been provided for both tank car and tank truck propane shipments from a nearby large bulk storage station. Figure 2 illustrates the flow of materials through the plant. Liquid propane is transferred to the storage tanks by the vapor compression method.

Propane vapor from the top of the storage tanks is sent directly to the reformer where the pressure is reduced to 30 psig by regulators. During the few extremely cold winter days, a vaporizer is

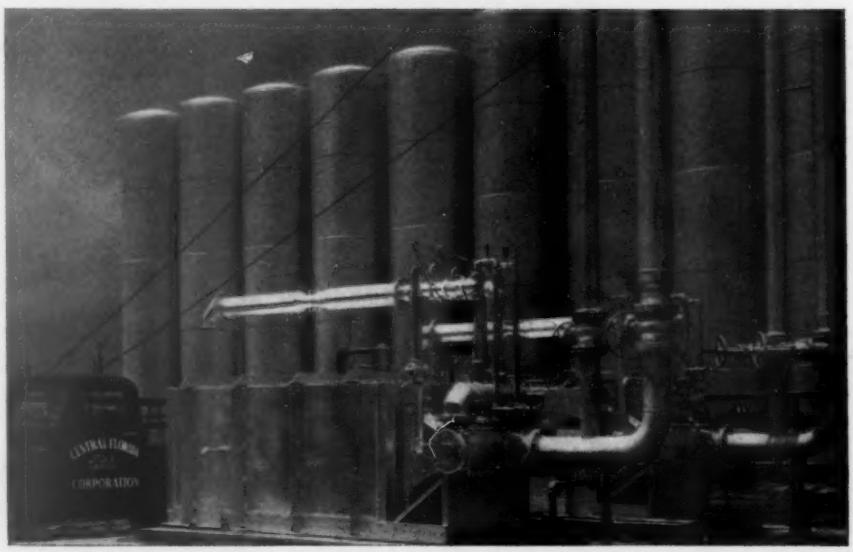


Figure 2—right—KOPPERS-HASCHE reformers, at Winter Haven, Fla., are in the foreground. Each of the 2 units is rated at production of 1 MMcf per day. The vertical tanks, with total capacity of 190 Mcf, store reformed gas that is ready for distribution.

AMERICAN Gas Journal FEATURE

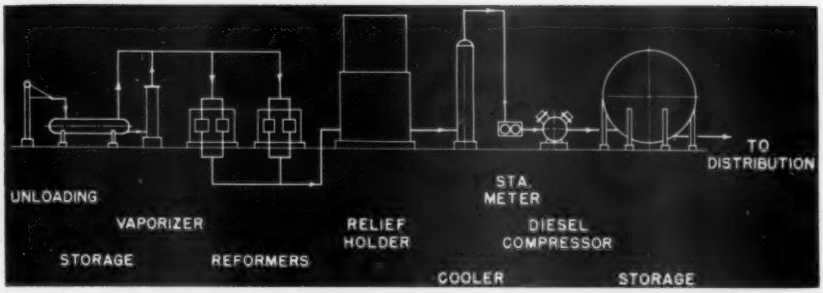


Figure 3—left—PROCESS FLOW diagram of Central Florida's plant.

used to augment the supply of propane vapor sent to the reformers.

The propane vapor at 30 psig enters the injector where a predetermined amount of air is inspirated. This non-inflammable air-gas mixture then flows through the 4-way reversing valve into one of the regenerative tile masses of the reformer.

In passing through this tile mass, the non-inflammable air-gas mixture is preheated to the auto-ignition point. As the mixture enters the combustion chamber a small portion is burned to supply the heat necessary for cracking and reforming. The heat liberated maintains the proper cracking temperature in the unit so that no external heat is needed beyond that required during the initial heating up.

From the combustion chamber, the reformed gases pass through the second regenerative tile mass where the greater portion of their sensible heat is extracted. The partially cooled gases leave the reformer through the 4-way reversing valve and are sent to the relief holder.

At regular intervals, the direction of flow through the reformer is reversed so that the gases enter through the second tile mass and leave through the first tile mass, thus utilizing the heat stored in the regenerator during the previous cycle.

After the relief holder, the reformed gases pass through the washer-cooler, then to the station meter and the diesel-driven reciprocating compressor, where the reformed gas is compressed to storage pressure of 75 psig.

No purification or gas conditioning, other than the washer-cooler, is required. The high pressure storage facilities consist of one Hortonsphere with a capacity of 200 Mcf and 19 vertical cylindrical tanks, 8′ diameter by 40′ feet long, with capacity of 190 Mcf.

The total storage capacity of 390 Mcf is capable of meeting one normal day's sendout of reformed gas. From the high pressure storage, reformed gas is delivered directly to the distribution mains.

A continuous record of the heating value and specific gravity of the reformed gas is provided by a Cutler Hammer Thermeter and a Ranarex, which are the only production control instruments required.

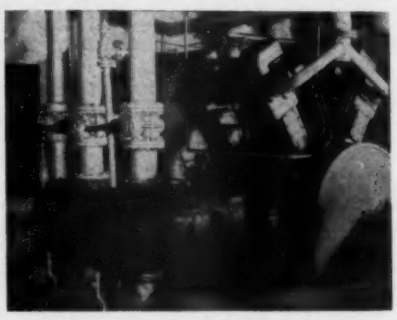


Figure 4—left—INGERSOLL-RAND diesel-driven, single-stage, duplex reciprocating compressor that delivers the reformed gas to storage at 75 psig.

Facilities expanded

Since the original installation, a second reforming unit, also with a capacity of 1 MMcf/day, was installed to provide standby facilities and to meet all peak-load requirements.

Excessive peak loads in the Lake Wales area have necessitated the installation of high pressure storage facilities in that town which automatically cut in when the line pressure drops below 7 psig. These tanks are filled from the transmission line by an auxiliary compressor used during off-peak periods.

During the first year of operation, the Hasche reformers at Winter Haven produced a total of 135,453,300 CF of 525 Btu equivalent gas from 805,947 gallons of propane, an average of 5.95 gallons of propane per Mcf, or an overall efficiency of 96%.

The diesel-powered Ingersoll-Rand compressor will handle the output of 1 Mcf of 656 Btu reformed gas, or 1,250 Mcf of 525 Btu equivalent. Approximately 0.18 gallons of No. 1 diesel oil is required to compress 1 Mcf of sendout gas at a cost of about 2¢ per Mcf.

During peak-load periods, which represent only a few days per year at Winter Haven, a 150 hp steam boiler supplies steam for the auxiliary steam-driven compressors and the propane vaporizer. Cooling water for the washer-cooler is recirculated from the discharge through cooling coils, and returned to the washer-cooler by an electrically-driven pump.

With the efficiency of 96%, fuel costs per Mcf of 525 Btu for the various delivered prices of propane will be:

Propane delivered/gal.	Fuel cost/Mcf
7¢	$0.417
8¢	0.476
9¢	0.536
10¢	0.595

A small electric generator powered by a gasoline engine has been installed to supply the power required for the air compressor and timer on the reformer during electrical power failures.

Results

During the first year of operation with the Hasche sets, ending July 1, 1954, the company had proved to itself that its 3 objectives in installing the reformers had been successfully attained. The labor problem had been solved to a greater degree than the company had anticipated; the company now knew that for 90% of the year it could make its gas with a streamlined operating force of 3 men, including the night watchman. The purifiers, for sulphur, were no longer required since propane contains no sulphur. General plant maintenance expenses were greatly reduced because the machinery that previously had required servicing was no longer in use.

Doubling the plant's sendout capacity had been accomplished at a very reasonable cost. The company is satisfied, while not yet able to release exact figures, that it is now saving more money in operating costs than it had anticipated, in a comparison with its previous cost of operating the water gas sets.

There are also some indirect savings in distribution costs from the constant quality of the gas and improved service. Even though the Hasche-reformed gas has been distributed for about a year, increased sales per meter are evident.

Test burners, accurately adjusted on the carburetted water gas with a heating value

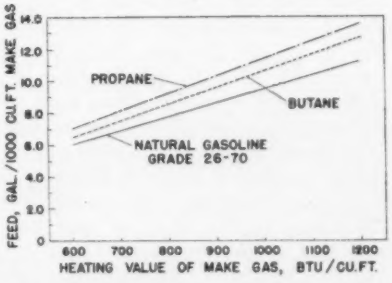


Figure 5—REFORMED GAS feed requirements, in gallons of feed per Mcf of make gas.

of 525 Btu and a specific gravity of 0.75, were found to give the best burning characteristics when using a 656 Btu reformed propane with a 0.92 specific gravity.

For a short period following the changeover, there was an increase in customer complaints due largely to poor adjustments of appliances on the old gas, and possibly some oil accumulation in high pressure storage lines. In the succeeding months it was evident that the constant gas quality the Hasche process makes possible—close Btu control, uniform specific gravity, and unchanging chemical composition—has definitely resulted in a decrease in service complaints.

Successful operation of Central Florida's reforming unit is representative of the story repeated by all users. To date there are 15 reformers, varying in size from 500 Mcf per day to 2.5 MMcf per day, installed and producing interchangable heating gases. They are located in:

Johnson City, Tenn.	North Miami, Fla.
Wilmington, N. C.	Keene, N. H.
Kinston, N. C.	St. Johnsbury, Vt.
Charleston, S. C.	Fredericksburg, Va.

Turn to page 42—FLORIDA COMPANY

Texas-Produced Steel Pipe Normalize

TEXAS-produced gas, Texas-produced iron ore, Texas-produced steel and Texas-produced steel pipe—for use by the gas and oil industry of Texas and the other 47 states—form a spectacular feature in which the gas industry and the related equipment manufacturers may take justifiable pride.

Lone Star Steel Company, with exececutive offices in Dallas and mills at Lone Star, started operations, recently, in a pipe mill which includes precisely-coordinated equipment for welding and normalizing tubular goods, continuously and at high production rates.

The planned production of tubular products designed into the Lone Star Steel plant and facilities was to be approximately 350,000 tons per year. The steel producing facilities and mills for the production of the tubular products consist of 4 basic open hearth furnaces with a combined total of 500,000 net tons of steel ingots per year. There are a slabbing mill, plate mill and a hot strip mill of large capacity. The rolled strip is suitable for the two pipe mills that produce the welded tubular products. The No. 1 pipe mill is of proportions to produce welded pipe 4½″-to-16″ O.D.; the No. 2 pipe mill produces 1.90″-to-6.625″ O.D. pipe.

During the design layout of the plant, considerable attention was focussed on the heat treatment that would be required, with emphasis upon quality of product, economic use of manpower, and design that would provide heat-processing as an integral part of the high-speed production line. Because of many years of research, substantiated by operating equipment in many other tube mills, Selas Corporation of America was requested by the consulting engineers, A. J. Boynton and Co., and the engineers of Lone Star Steel Co., to submit a recommendation for suitable Gradiation, in-line continuous furnace equipment required for the two pipe mills. The equipment was to be capable of heat treating in pace with the pipe mill production.

Steel industry experience with rapid transfer of radiant-gas energy to the product under treatment indicated that short cycles could be used. It was decided to conduct tests that would determine the shortest operating cycle to produce satisfactorily normalized welded tubing. If the results of these tests were conclusive, the required size of continuous furnace equipment would be of small proportions, for installation in a confined area, and in-line with the tube mill.

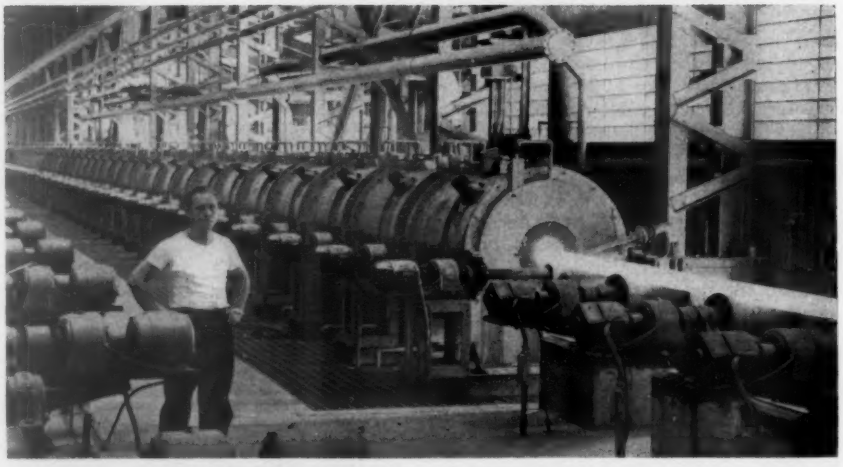


Figure 1—NORMALIZING LINE in Lone Star Steel Co. pipe mill, with 33 radiant-gas furnaces. The line has 7 zones of automatic temperature regulation, permitting flexibility in meeting the processing requirements of wide ranges of tube diameters and wall thicknesses.

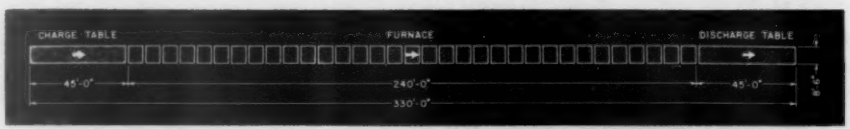
Figure 2—STEEL TUBE emerging from final chamber in the 33-furnace line. Freedom from oxide is indicated by the "shine" on the hot tube which has been in protective atmosphere during passage through the gas-fired equipment.

Comparison of equipment space

The comparative size of furnaces considered in the layout of the new tube mills is illustrated in Figure 3. The approximate sizes are for Lone Star Steel's large No. 1 mill operations. Furnace equipment, in either case, would have to process 16″ pipe.

The Selas line required only 2,805 sq. ft. of floor space, with the labor-saving feature of in-line design. The conventional type of furnace would have required 8,400 sq. ft., a ratio of approximately 3-to-1, and did not provide in-line features.

Control-flexibility of a multiple-furnace line is achieved by dividing the total 240′ of furnace length into 7 control zones. Each zone is independent and, in case of reduced production, individual zones can be shut



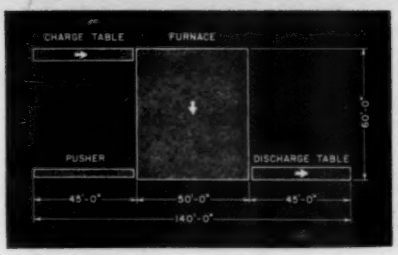


Figure 3—FLOOR SPACE requirements were compared by Lone Star Steel Co. Conventional furnace equipment, right, required 8,400 sq. ft. The Selas in-line, short-cycle equipment, above, required 2,805 sq. ft. and had higher production capacity.

AMERICAN Gas Journal FEATURE

...y High-Speed In-Line Gas Equipment

by **James Kniveton**
Vice President
Selas Corporation of America

off completely to avoid burning excessive fuel when operating under reduced capacity.

Several samples of welded tubing were gas-heated and tested, proving conclusively that a tube uniformly- and rapidly-heated in the range of 1,650-to-1,700° F produced a full solution of the carbon and complete recrystallization of the heterogenous grain structure throughout the pipe—especially in the area of the weld.

The full-normalize of all welded products was determined as necessary to obtain the physical and metallurgical characteristics specified for the use of tubular material in oil country operations. Considering the welding speeds of the two pipe mills, the first decision was to install normalizing equipment for each mill. However, the magnitude of the production was such that if the old concept of raising the pipe to the normalizing temperature, and then holding for the length of time that had been used, considerable furnace equipment would have been required, with the necessity for allotting extensive floor space to accommodate the older, more conventional type of furnace equipment.

3,000 pounds per minute

The No. 1 tube mill welding speed, variable in accordance with the gauge of pipe, required a normalizing production rate of 3,000#/min, forward speeds to be synchronized with the 40-to-120'/min welding speed. The No. 2 line, producing smaller sizes, required a rated maximum production of 1,500#/min, with speeds through the furnace matching the welding speed of 50-to-150'/min.

If holding time were necessary to accomplish the desired end results on the product, it can be readily visualized that large, bulky furnaces would have to be installed.

A photomicrograph study was made at the weld, before and after normalizing, with similar studies made at points adjacent to the weld. The results are illustrated in Figure 4.

Tensile and hardness tests were made on tubing in an as-welded condition; other samples were normalized with a holding period of 15 minutes. Then, additional samples that had been normalized by a Selas short-cycle treatment were tested. The results of these tests are shown in the table accompanying Figure 5.

The tensile and hardness tests conducted on 4" O.D. × .125" wall low carbon (range: .010-.015%) tubing, heated from room temperature to 1,650° F in 66 seconds by the Selas method were compared with tubing that had been normalized by a conventional method, from room temperature to 1,650° F in 6 minutes and then holding for 15 minutes.

Photomicrographs of electric welded tubing

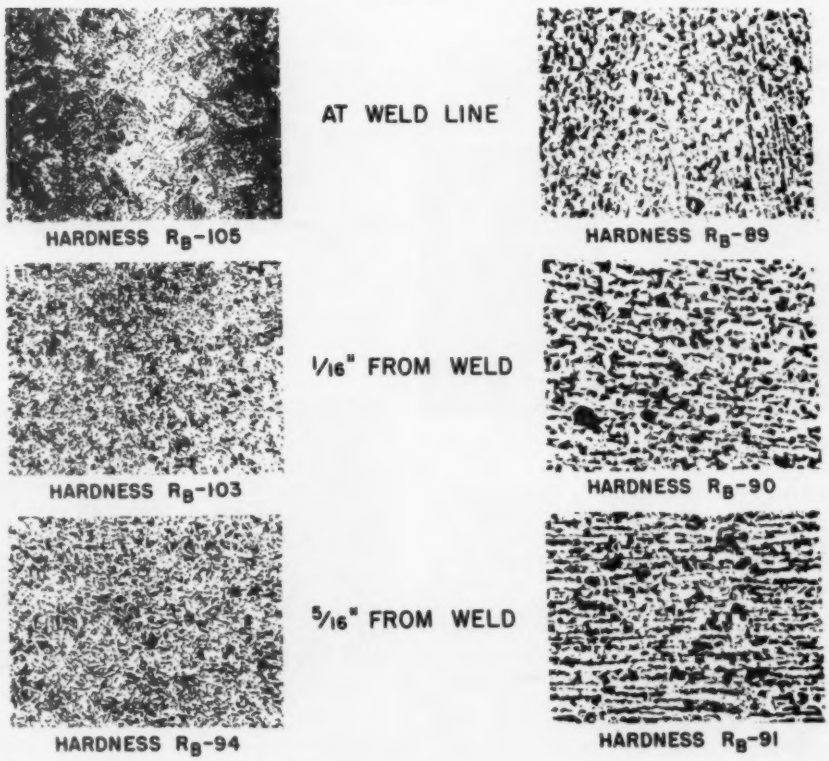


Figure 4—BEFORE AND AFTER normalizing, electric welded tubing, 9⅝" O.D. x 0.352" wall was checked and these illustrations show the metallurgical structure. Tube analysis is C = 0.24, Mn = 1.15.

The finer grain resulting from the short-cycle normalizing produces higher hardness, strength and yield-tensile ratio with but slight lowering of ductility. Normalized tubing produced by the Selas method withstands flattening, flaring, flanging and crushing tests without splitting at the weld.

In every respect the normalized tubing produced in the short cycle met all specification requirements.

The 4" O.D. tubing is heat processed at a speed of 90'/min, matching the welding speed. At that heating rate, it is necessary to have only 2½ lengths of 40' tubing in the line at one time. Comparing the same size tubing produced at the same welding speed, the conventional type of furnace would have 47.25 lengths of 40' tubing in the furnace at any one time, because of the 6 minute heating and 15 minute holding period.

With the limited number of tubes under heat in the Gradiation equipment, surface oxidation is at a minimum, resulting in a cleaner end-product.

Broad specifications, as to the large number of tube diameters and wall thicknesses with corresponding difference in tube weight, dictated that each normalizing line must be extremely flexible, mechanically and thermally. Ability to operate efficiently at reduced mill capacity was of paramount importance. Those requirements were met by two furnace lines with 33 Gradiation furnaces in each line, and with 7 zones of automatic temperature regulation in each line.

Zone-controlled temperature

The first 4 zones of temperature control applied to each line regulate the temperature to establish the gradient required by the combined-considerations of tube diameter, wall thickness and the normalizing

Turn to page 42—TEXAS PIPE

Land-the-Load Is Theme of 1954 AGA Convention

THE 36th annual convention of American Gas Association, in Atlantic City, N. J., October 11-13, will have as its special feature a Team-up—Land-the-load meeting that is designed to show the working advantages that are available to the gas industry through fuller coordination of the selling segments of the industry.

AGA bills the land-the-load meeting as "inspirational." L. L. Baxter, president, Arkansas Western Gas Co., will preside.

A report on the status of the gas industry

Earl H. Eacker

F. M. Banks

development plan will be presented by W. M. Jacobs, vice president, Southern California Gas Co., using as his subject matter the work done in Pasadena, one of the 10 action demonstration cities.

E. Carl Sorby, vice president, Geo. D. Roper Corp., will illustrate the sales possibilities inherent in new range developments under the PAR plan and from the laboratories of manufacturers.

E. H. Eacker, president, Boston Consolidated Gas Co., and AGA president, is scheduled to diagnose the industry's ills and give his prescription for their cure.

The president's address, to be delivered by Mr. Eacker, will present delegates with a pertinent review of industry conditions and Association plans.

Officers of the association will be elected at a general session. Directors will be elected at an executive session. Norman B. Bertolette, president, Hartford Gas Co., will present the report of the general nominating committee.

Mr. Bertolette, chairman of the AGA Laboratories managing committee, also will sponsor an historic event in Association records. A new wing at the Cleveland laboratories is to be dedicated to Raymond M. Conner, first director of the laboratories. A bronze plaque, commemorating the dedication will be presented to Mr. Conner.

Other awards for outstanding accomplishments by gas industry members during the past year will be made by President Eacker.

Sheldon Coleman, president, Gas Appliance Manufacturers Association, and president, The Coleman Company, Inc., will open a general session, and will include slides with which he will show where the industry has been, where it is today and where it may go.

J. Theodore Wolfe, executive vice-president, Consolidated Gas Electric Light and Power Company, will bring delegates up-to-date on the gas industry development program, in his talk, "The Gas Industry In Action."

Effects of the Supreme Court decision on his company and on other producers will be discussed by K. S. Adams, chairman of the board, Phillips Petroleum Co.

John J. McCloy, chairman of the board, Chase National Bank, will speak on the dynamic aspects that shape our economic life, and their impact on American business and industry.

The operating section meetings will be held at the Claridge Hotel with F. J. Pfluke, Rochester Gas & Electric Corp., chairman. John E. Overbeck, Columbia Gas System Service Corp., will report for the committee

W. M. Jacobs

J. Theodore Wolfe

on gas measurement and A. L. Vaughn, Northern Natural Gas Co., will deliver a paper on natural gas conditioning processes. E. W. Kenefake, General Electric Co., will present a feature devoted to remote controlled operation of pipelines. Closed-circuit color television demonstrations and instrumentation will be shown.

A panel session on customer service, headed by W. W. Gilliss, will be guided by Calvin Brown, Rochester Gas & Electric Corp., J. H. Dennis, Long Island Lighting Co., J. G. White, The Peoples Gas Light & Coke Co., C. S. Hazel, Philadelphia Gas Works and W. M. Hawkins, Laclede Gas Co.

John R. Gardner, Central Hudson Gas & Electric Co., will report for the subcommittee on customer load characteristics. H. L. Hamilton, of A. V. Smith Engineering Co., will speak on insulating joints as a safety measure and D. L. White, Washington Gas Light Co., will head a panel on quality control.

Accounting section meetings, under Paul Ewers, Michigan Consolidated Gas Co., chairman, will include presentations by W. D. Sweetman, The Peoples Gas Light & Coke Co., who will discuss ways of combating operating expenses; Earl G. Planty, Johnson & Johnson Co., will talk on training personnel to produce more enlightened management.

The residential gas section will sponsor only one meeting. It will be a promotional meeting, with Walter H. Kurdelski, Michigan Consolidated Gas Co., as chairman.

Mr. Kurdelski will review the sales and promotional programs of AGA designed to help solve industry merchandising problems. Frank C. Smith, president, Houston Natural Gas Corp., and past president of AGA, will deliver an address, "This Is It!"

A feature at the residential session will be a showing of "A Word to the Wives," a color movie produced by *Woman's Home Companion*, AGA and National Association of Home Builders. It stars Marsha Hunt and Darren McGavin.

"Selling Tomorrow's Homemakers Today," by Frank H. Trembly, vice president, Philadelphia Gas Works, will be a summary of educational work being done by AGA.

A dramatization of the laundry as a vehicle for selling water heaters and dryers will be staged by C. E. Bartlett and Frank A. McFerran, Ruud Manufacturing Co., and W. W. Selzer, Columbia Gas System Service Corp.

The annual home service breakfast will be presided over by Mary E. Huck, The Ohio Fuel Gas Co. The theme this year will be "South Shore Melodies."

Sheldon Coleman

F. H. Trembly, Jr.

The round table for home service, a separate event, will again have Mary E. Huck presiding.

Charles C. Eeles, The Ohio Fuel Gas Co., as section chairman, will preside at the luncheon meeting of the industrial and commercial gas section and F. Marion Banks, president, Southern California Gas Co. and president-elect of AGA, will deliver the luncheon address.

The benefits derived from attracting new industries, in industrial, residential and commercial loads, will be presented by Clayton S. Conkright, Public Service Electric & Gas Co. From experience gained in the highly-competitive TVA area, Edwin S. Mack, Chattanooga Gas Co., will tell delegates how his company meets competition.

THIS is the second in a series of exclusive interviews with gas industry executives on public relations. Here, Remick McDowell speaks for American Gas Association. He emphasizes his opinions on the need for aggressive and continuing public relations efforts by all gas utilities, large and small; he emphasizes, also, his views on the problems involved in actuating both local and national public relations programs—programs that are coordinated with each other and with the programs of other gas industry associations and groups. Mr. McDowell, pictured above during the interview, is vice president, public relations and finance, The Peoples Gas Light and Coke Co., Chicago, and chairman, AGA public relations coordinating committee.

How AGA Publicizes Gas Industry

JOURNAL: Mr. McDowell, will you fill us in on some of the details about AGA's public information program?

MCDOWELL: I'm pleased to discuss it because I believe that an organized public information, or public relations program is vital to the gas industry's welfare. The AGA public information committee, with W. M. Kimball as chairman, has initiated a number of basic public relations activities this year to assist local companies in their day-to-day relations with the public. In the near future—we hope—these activities will expand into a full-fledged public relations program.

JOURNAL: Are you implying that a full-fledged public relations program is definitely in the works?

MCDOWELL: Such a program is indeed the goal. AGA's Operation Public Relations has definite outline, definite scope, definite objectives. And this year a start has been made toward putting meat on those bones. Our studies have shown us that the need for a full-scale program is far greater and more pressing than we had supposed. But, it's gratifying to report that a foundation has been put down for an integrated, industry-wide PR program.

JOURNAL: In operation, does AGA tell member-companies what to do and how to do it?

MCDOWELL: No, indeed! AGA supplies the ammunition, with examples of successful application. From there on in, the companies are urged to adapt these materials and ideas to their specific local situations.

JOURNAL: Just how would you define the program's objectives?

MCDOWELL: Here's the overall definition in one sentence: to build greater local and national understanding of the gas industry, to identify its policies and operation with the public interest, and to establish wider recognition of the indispensable role of gas in homes, business and industry.

JOURNAL: That's a commendable definition, Mr. McDowell, but how will AGA be able to watchdog the activities?

MCDOWELL: Each activity leading to the attainment of these goals is closely supervised by the AGA public information committee of 16 gas company experts from all sections of the country.

JOURNAL: Is the basic idea, then, to make an actuality of that over-worked phrase, "grass-roots public relations"?

MCDOWELL: You could put it that way —yes—or, you could simply quote our initial public relations theme—

JOURNAL: How does that go, again?

MCDOWELL: "Modern gas service is vital to the progress of your community." This theme reflects gas service and gas appliances for higher standards of living.

JOURNAL: What specific steps are implementing this program?

MCDOWELL: The answer to that really comes from the individual gas companies —not from associations or committees. The companies must determine, by action or lack of it, just what the future of their industry is to be. But—realizing that the overall public relations approach should be industry-wide, AGA has appointed a committee of 5 gas industry executives to work toward coordination of its public relations activities with other organizations within the industry such as INGAA, GAMA and National Council for LP-Gas Promotion. This committee attempts to achieve maximum effectiveness and to avoid duplication of effort.

Broad coordination essential

JOURNAL: Isn't that in conflict with your statement about the local aspects of the overall plan?

MCDOWELL: No, indeed. As I've indicated, the local aspects are the key to the whole plan. To be effective, our public relations activities must show the public that the gas companies are real citizens of their communities. That's the local level—and it's only at the local level that the ultimate consumer is reached day-in and day-out. So that's where all PR efforts must be focused. But this doesn't mean, either, that only the local aspects are stressed. Actually, the job of marshalling public support is extremely complex and delicately balanced. That's why it requires not only aggressive local action but also coordination and complementary national action.

JOURNAL: What do you see as the obstacles to be overcome before the gas industry can sit back and say that it has its PR job well in hand?

MCDOWELL: Well, in the first place I don't think the day will ever come when the gas industry will be able to sit back and contemplate its public relations job with complete satisfaction. Success in PR comes from keeping everlastingly on top of the job. But the best way to answer your question directly, I think, is to take a close look at some highly significant problems turned up by a recent AGA survey. That showed up problem no. 1—public relations activities completely lacking in many companies, particularly smaller ones. In almost all companies public relations needs far greater local emphasis.

JOURNAL: Well—what's AGA doing to solve that one?

MCDOWELL: A number of things—joint conferences have been held by AGA, INGAA, GAMA, the LP gas people and regional groups to help local companies really see and solve their public relations problems. After 2 conferences, in Boston and in Omaha, it was gratifying to hear comment such as, ". . . this is the first time there has been real integration of the different associations toward common goals." Also, AGA member-companies are now receiving "Intercom," the first public relations news letter devoted solely to gas utilities. Then, there is now under way a special exchange of materials, ideas and techniques of successful PR programs which AGA fans out to all interested companies—whether or not they belong to AGA. A few weeks ago, the first of a series of how-to-do-it booklets on basic public relations was distributed industry-wide. Now a-building, is what you might call a national speakers bureau through which AGA arranges to have top-flight public relations speakers on gas industry conference programs wherever possible.

JOURNAL: Where does employee participation figure—if it does—in your overall program?

MCDOWELL: It very definitely does figure in our program—and in a big way. In fact, you've jumped the gun on the next entry in my list of the industry's things-to-do-today. I see as problem no. 2 the fact that many gas industry employees are

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American Gas Journal FEATURE

Price Indexes of Gas, Other Fuels and Electricity

A SMALL upward change in the index of net monthly bills for gas was recorded by U. S. Bureau of Labor Statistics for the month of July from data collected in both large and small cities.

ELECTRICITY RATES also moved up in the index for all cities, combined. BLS attributes that to rates and fuel adjustment.

BITUMINOUS COAL PRICES advanced in 6 of the 26 cities surveyed. One city, Evansville, Ind., had reductions ranging from 25-to-67¢ per net ton. The increases ran from 20-to-70¢ per net ton.

ANTHRACITE PRICES were higher in 4 of the 9 BLS-survey cities; increases were from 20-to-60¢ per net ton.

FUEL OIL PRICES increased in 1 city and decreased in 4, with the average for the index unchanged. The July index was 2.1% below the comparable level of 1953.

Source: Bureau of Labor Statistics, U. S. Department of Labor (1947-1949 = 100.0)

	1954							1953						
	July	June	May	Apr.	Mar.	Feb.	Jan.	Dec.	Nov.	Oct.	Sept.	Aug.	June	Jan.
GAS														
Space heating	114.4	114.3	114.5	114.1	113.9	113.7	113.6	113.6	113.5	112.8	112.4	112.5	111.2	108.9
Non-space heating	108.9	108.8	108.9	108.8	108.8	108.8	108.8	108.8	108.8	108.2	108.0	108.0	107.2	106.4
Natural														
10 therms	99.9	99.7	100.0	99.9	99.9	99.9	100.0	100.0	99.8	99.9	99.8	99.8	98.7	98.3
25 therms	112.5	112.3	112.6	112.3	112.3	112.2	112.2	112.2	112.2	111.4	111.3	111.3	110.2	108.9
Manufactured														
10 therms	109.2	109.4	109.4	109.4	109.4	109.4	109.4	109.5	109.5	108.2	108.1	108.1	107.4	106.9
25 therms	109.4	109.6	109.5	109.6	109.6	109.6	109.6	109.7	109.7	109.1	109.0	109.1	108.4	107.8
Mixed														
10 therms	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.4	96.0	96.0	96.2	96.2
25 therms	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4	99.9	99.9	100.0	100.0
All types combined														
10 therms	105.2	105.2	105.3	105.2	105.2	105.2	105.3	105.4	105.3	104.8	104.7	104.7	103.9	103.5
25 therms	112.7	112.6	112.8	112.6	112.6	112.5	112.5	112.5	112.5	111.8	111.7	111.7	110.7	109.6
ELECTRICITY														
Composite	104.8	104.5	104.5	104.5	104.5	104.4	103.8	103.8	104.2	104.2	104.1	104.1	104.1	104.4
SOLID FUELS														
Bituminous—All sizes combined	117.4	117.2	117.2	119.5	120.6	120.6	120.7	120.6	120.4	120.2	119.5	118.3	117.3	119.8
Anthracite—All sizes combined	124.7	124.1	123.1	130.2	135.0	135.0	135.0	135.0	135.0	134.9	134.8	133.7	130.6	135.9
PETROLEUM														
Fuel oil No. 2	117.7	117.7	118.1	120.6	122.1	123.2	121.9	120.9	122.7	122.5	120.2	120.3	117.9	116.6

THE INDEX of retail prices of fuels and electricity, issued monthly by the Bureau of Labor Statistics, U. S. Department of Labor, considers specific consumption quantities of gas, 10 and 25 therms, representing typical usage by families represented in the Bureau's Consumer Price Index.

Monthly gas bills, net, are basis for computing the index. Data are collected in these cities:

NATURAL GAS: Atlanta, Baltimore, Cincinnati, Cleveland, Detroit, Houston, Kansas City, Los Angeles, Minneapolis, New York, Pittsburgh, St. Louis, San Francisco, Washington

MANUFACTURED GAS: Boston, New York, Portland, Ore., Scranton, Seattle

MIXED GAS: Chicago, Philadelphia

The index for electricity is based upon data collected in the same list of cities.

Anthracite prices are collected in 9 large and small cities; bituminous prices in 26 large and small cities; fuel oil No. 2 prices, from 11 cities.

The base period of the index is the average for the years 1947, 1948 and 1949. That average is referred to as "100.0."

Month-to-month net retail prices and applicable taxes are compared with the base, and computed to express, as an index number, any change from the base. While these indicators are numbers, they may be interpreted directly as percentages of change from the base period.

Examples: A current index number of 121.8 indicates a 21.8% increase from the base period; an index number of 96.4 indicates a decrease of 3.6% from the base period. This percentage comparison is applicable only from the current index to the base period.

Percentages of change from one index number to another comparable index number, other than the base (100.0), can be calculated: Subtract the older number from the new number, then divide the difference by the older number.

Examples: Older number is 115; newer number is 125; difference is 10. Divide 10 by 115; answer is 0.0869, or an 8.7% increase. Older number is 125; newer number is 115; difference is 10. Divide 10 by 125; answer is 0.080, or an 8.0% decrease.

Index of Yields: Selected Utilities Stocks

Expressed as percentages

	1954									1953					
	Sept.	Aug.	July	June	May	Apr.	Mar.	Feb.	Jan.	Dec.	Nov.	Oct.	Sept.	June	Jan.
Transmission companies	4.17	4.17	4.25	4.04	4.08	4.15	4.17	4.25	4.21	4.39	4.44	4.44	4.90	4.72	4.04
Transm. & distrib. companies	4.61	4.67	4.88	5.01	5.01	5.11	5.27	5.39	5.39	5.54	5.49	5.58	5.74	5.55	5.02
Manufactured & mixed companies	4.16	4.26	4.36	4.45	4.46	4.67	4.68	4.66	4.66	4.91	4.75	4.94	5.14	5.08	4.87
Class "A" electric companies	4.36	4.31	4.31	4.60	4.64	4.70	4.68	4.92	4.92	5.10	5.15	5.14	5.41	5.53	5.08
Class "B" electric companies	4.74	4.70	4.78	4.83	4.94	4.94	4.93	5.01	5.14	5.23	5.14	5.37	5.61	5.68	5.19

This is a straight arithmetical index of comparative yields obtainable on a selected group of gas and electric utility industry common stocks.

The companies comprising this index have been selected by the AMERICAN GAS JOURNAL as providing a representative cross-section of each industry, from the standpoint of geographical diversification and of the relative importance of the individual companies in their areas.

No effort has been made to weight the average to give effect to changes in capitalization or in dividend rates because the yields afforded on the issues reflect such changes. The index is designed to show the rate of return and not necessarily market movements on the stocks comprising it.

This index is compiled from: natural gas transmission companies, 5; natural gas transmission and distribution companies, 5; manufactured and mixed gas companies, 4; class "A" electric companies, 4; class "B" electric companies, 5.

Cautious Attitude Toward Equities Is Seen

By **John F. Falvey**
Financial Editor

IN its recent hesitant action the stock market has been reflecting the warning of economists and of market observers that stock price movements are bound to become more selective, both by groups and individual issues, regardless of what the stock market averages as a whole may do.

Underlying the word of caution is the fact that stock price averages recently attained the highest level they had reached since the so-called bull market of 1929. Back of the rise, it is pointed out, have been expanding sales volumes and inflationary price trends which to date have imparted considerable momentum to all groups of stocks except those of companies in the tobacco, brewing and leather industries. Failure of these three groups to participate in the upward movement of prices may be traced to unsettling influences with which each of the industries affected has had to contend.

In the short space of one year the stock market, according to one of the outstanding indices, moved ahead by 27%.

Adoption of a more cautious attitude toward equities is suggested on the threefold premise that business activity has ceased to expand, but has leveled out; competition is becoming far more keen, both within and between industries; and stocks are becoming more sensitive to adverse developments now that the over-all price-earnings ratio has risen so sharply.

It is true that corporate profits to date in 1954 have held up well. But it should be noted that this has been due chiefly to the fact that the 18% drop in corporate income before taxes has been largely cushioned by the 25% decline which has occurred in corporate income taxes.

The net result has been that more than two-thirds of the contraction in corporate profits before taxes has been absorbed by the tax reduction, so that the curtailment in net income after taxes has been held to a mere 10%. And there is a strong possibility that for the balance of this year the decline from year-earlier levels may be smaller. Fourth quarter returns this year will have the benefit of competing with declining profits in the final three months of 1953 when the business recession already was under way; some industries are expected to show improvement in the weeks ahead; and management in numerous industrial lines is endeavoring to obtain better cost controls and thus improve profit margins.

But taxes cannot be expected to continue providing as much of a cushion for declining profits as they have to date this year. Ending of the excess profits tax provided a substantial source of non-recurring protection for net profits after taxes in 1954, and reduction in taxes now in prospect will be reflected in increasing measure after the year-end.

Insofar as concerns utility stocks alone, the point is made by these seasoned market observers that the normal yardsticks by which stocks are valued have been stretched out so gradually that investors have become accustomed to the higher appraisals and, as so often happens, they begin to believe that past standards no longer apply.

Since the low point of last year, utility share prices have advanced 34%, compared with gains of only 1.4% in earnings and of 6.5% in dividends. In consequence, the price-earnings ratio at last report was 16.2 times and yield return had declined to a mere 4.6%, and market prices as a group, according to one of the leading indices, had risen to a point 65% above unweighted book value. This is an abnormally high premium of market price over book value in the light of the close regulation to which the utilities as a group are subject.

The deviation between market price and book value now is greater than at any previous time since the early years following World War II, when prices advanced substantially in anticipation of an upturn in earnings and dividends. If there were some expectation of a sharp increase in earnings and dividends, the proponents of caution toward utility equities say, we would be willing to accept the current level of prices as a normal discounting of future developments. However, the recent excess profits tax was not burdensome to most utilities and, except for a few companies, the benefits of rate increases have been largely realized. Actually, utility earnings have been disappointing over the past year as indicated by the fact that the preliminary weighted earnings of Moody's average amounted to only $2.83 a share in the 12 months ended June 30, 1954 or only 1.43% above the $2.79 a share reported for the corresponding period of the previous year, and 1.80% above the $2.78 a share reported for the 1953 calendar year. Furthermore, in many cases, earnings have been maintained only by an increase in the credit for interest charged to construction, which will run out as the construction programs are completed. Even though this will provide a respite from the large amount of equity financing which has diluted earnings in recent years, there appears little prospect that earnings will increase the 25% necessary to reestablish the normal price-earnings ratio of 13 times for some time to come.

Although yields on utility common stocks have been reduced by strong demand witnessed to date for these shares, especially from institutional investors, it is significant that at this writing utility equities on the average provide a return of 4.66%, against 3.11% for sound bonds of companies in the industry. The difference of 155 basis points compares with the divergence of 184 basis points in 1953, a reduction of only about 16%. So long as institutional demand for utility common shares is maintained at or near its prevailing level, no further substantial reduction in the difference in yield return between utility industry sound bonds and equity stocks seems to be in prospect, particularly since present market quotations for utility bonds is so close to the 3% yield which institutional investors have indicated is the lowest return they will agree to accept in their purchases of utility obligations.

But while the spread between bond and stock yields now is smaller than it had been during World War II and in the immediate post-war years, it must be remembered that yield spreads then were abnormally wide by comparison with long-range averages, due in no small measure to a lack of confidence that dividends then being paid could be maintained and also to the extremely heavy flow of institutional funds then going into the bond market. The narrowing recently in evidence between yields on bonds and stocks might be described as a return to a more nearly normal historical relationship between bonds and equities.

For the fifth year in succession corporate dividend payments in 1954 will total more than $9 billion. This steady record of payments, together with waning of fears anent a recession in business, affords basis for belief of buyers of the better type common stocks—such as utility equities—to regard current payments as reasonably well assured.

In the face of this fairly sound conclusion, however, it is strange to see the tremendous build-up of savings accounts by individuals shown by an analysis of its savings accounts made by one of the country's largest savings banks. This compilation shows that fully 19% of all savings deposits with this institution aggregated more than $5,000 and that the total amount of money represented by these large savings accounts constituted more than 55% of the combined total of its entire savings accounts.

This startlingly large total raises the question whether the public utility industry—but most certainly the investment fraternity—is doing a really worth-while job in selling the average individual on the merits of sound common stocks as a medium of investment and for obtaining an adequate income return.

If anything, investment opinion has been excessively cautious as to public utility stocks, sharpening pencils too fine as to financial ratios and minimizing the influence of satisfactory experience of investors who are content to wait until the dynamics of growth overtake the effect on per share earnings of increases in outstanding securities. The list of stocks certainly is large enough, and provides the prospective investor with considerable in the choice of area, size of utility, regulation and other characteristics.

Even in the so-called institutional type

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SELECTED UTILITIES STOCKS

See bottom of facing page.

American Gas Journal FEATURE

FEDERAL POWER COMMISSION

Approve settlement; TGT withdraws proposed $13,616,000 increase

The Commission has approved a settlement, including withdrawal by Tennessee Gas Transmission Co. of its proposed $13,616,000, or 10.3%, annual wholesale natural gas rate increase which has been under suspension since last June 1.

The settlement was agreed to by all parties to the proceeding on August 31 for the Commission's consideration and action. There were more than 100 interveners in the proceeding.

The settlement also provides that Tennessee must refund to its customers any amounts it may receive as refunds as the result of the final disposition of other pending rate proceedings involving United Gas Pipe Line Co., which transports gas for Tennessee. However, Tennessee will not be required to reduce its currently effective rates as a result of the final outcome of the United proceedings.

Tennessee also agreed as part of the settlement not to propose any changes in its sales service zone boundaries, nor—without the consent of all its transportation service customers—propose any changes in its transportation service, zone boundaries, in any filings made with FPC prior to next June 1.

Hearings on Tennessee's proposed increase commenced last June 28. A motion was made on July 1 by East Tennessee Natural Gas Co., an intervener, to dismiss the entire proceeding and for oral argument before the Commission. Counsel for a number of other interveners concurred in this motion, and on July 2 Diamond Alkali Co., another intervener, filed a motion for an order denying the rate increase to the extent that it depended on claimed increases in the cost of purchased gas, estimated at about $10.9 million per year. The FPC staff counsel subsequently joined in the motions that the proceeding be dismissed.

Suspend Col-Wyo Gas Company's proposed $1,147,000 rate increase

The Commission has suspended until February 1, 1955, pending hearing and decision, a proposed $1,147,000 annual wholesale natural gas rate increase by Colorado-Wyoming Gas Co.

The company had proposed to make the increased rates effective September 11. The new rates would result in a 35% annual increase over the rates which the company is now collecting, subject to refund, in another proceeding.

The Commission said that the proposed increase is based largely on the higher rates proposed by Colorado Interstate Gas Co. Colorado Interstate's proposed increase was suspended by an FPC order issued August 26 until February 1, 1955. The Commission pointed out that Colorado-Wyoming purchases more than 99% of its total natural gas requirements from Colorado Interstate and that the costs of this gas comprise the major portion of Colorado-Wyoming's total costs of service.

Accordingly, FPC declared, "Colorado-Wyoming's proposed increase may be unjust, unreasonable, unduly discriminatory or preferential and may place an undue burden upon ultimate consumers of natural gas."

The proposed increase would affect 4 wholesale customers in Wyoming and Colorado.

Montana Power Co asks approval to import natural gas from Canada

Montana Power Co. has applied to the Commission for authority to import natural gas from Alberta, Canada, to supplement supplies available to its pipeline system which serves markets in Montana.

The company proposes to import gas produced from the fields in the Pakowki Lake area in southeastern Alberta. The gas would be produced or purchased by Canadian-Montana Gas Co., Ltd., a wholly-owned subsidiary of Montana Power. It would then be delivered to Canadian-Montana Pipe Line Co., another wholly-owned subsidiary, which would make delivery to Montana Power through existing facilities at the U. S.-Canadian boundary.

The Commission in February of 1952 authorized Montana Power to import up to 40 MMcf of gas daily and a maximum of 10 billion cubic feet annually from Canada, to be used exclusively to render service to Anaconda Copper Mining Co. That authorization expires April 7, 1956.

Montana Power said that the Alberta petroleum and natural gas conservation board recently issued a new 20-year permit to Canadian-Montana Pipe Line Co. authorizing the export of a maximum of 100 MMcf of gas per day and up to 20 billion cubic feet per year. These volumes include the volumes heretofore authorized. Montana Power declared that these Canadian reserves "are urgently needed" to supplement its reserves in the United States to supply its over-all system requirements and permit the normal growth and expansion of its system.

The present imports, for use by Anaconda, are produced and transmitted by the two Canadian subsidiaries. Under the FPC's 1952 authorization, Montana Power constructed about 52 miles of pipeline from the Canadian border to a connection with its existing facilities near Cut Bank, Mont. This same line would be used to transport the newly-requested imports of gas, Montana Power said.

Northern Natural Gas Co files $315,000 wholesale rate reduction

The Commission has allowed tariff sheets filed by Northern Natural Gas Co. to take effect as of August 27, 1954, to provide for a $315,000 annual reduction in wholesale natural gas rates to reflect the invalidation of the Texas gathering tax.

Northern filed the reduction pursuant to a condition in an FPC order issued last January approving a settlement of a rate increase proceeding. The settlement was conditioned, among other things, to require Northern to refund the difference and to file new rate schedules to reflect the reduction in its costs if the Texas gathering tax was held to be invalid. The Supreme Court on February 8 ruled the gathering tax invalid. Northern proposes to pass along its reduction in costs by such tax invalidation by refunding to its wholesale customers at the rates of 0.27¢ per Mcf sales for the period from December 27, 1953, to August 27, 1954, and by filing a rate reduction of 0.16¢ per Mcf, amounting to $315,000, per year, to be effective August 27, 1954 which reflects the net reduction in its costs due to invalidation of the Texas gathering tax and the new Texas production tax effective September 1.

Modify order ruling independent producers; filing deadline Dec. 1

The Commission today modified order No. 174-A prescribing regulations to govern independent natural gas producers by extending from October 1 until December 1, the deadline for filing certificate applications and rate schedules.

FPC also modified the order to clarify its applicability to rate schedules for new service initiated after June 7, the date of the Supreme Court decision in the Phillips Petroleum Co. case.

The Commission said that other points and issues raised in the petitions for rehearing of Order No. 174-A will be decided as quickly as possible and appropriate announcement made. Order No. 174-A was issued August 6 to clarify and supersede Order No. 174, issued July 16. More than 100 petitions for rehearing were filed, and the FPC scheduled oral argument, which was held September 22 and 23.

FPC said that the objections, recommendations, proposals and contentions of all the petitioners, whether briefs were filed or oral argument presented on their behalf or not, will be given consideration. The Commission declared that many of the petitioners have shown that compliance with the October 1 filing requirements would work a hardship. Approximately 350 certificate applications and 1,500 rate filings have already been received, the Commission added, stating that "in order to handle these filings in an orderly manner it is desirable to extend the time requirement."

SoCalif Pipeline Capacity Up 150MMcf

Daily capacity of the pipeline which brings natural gas from West Texas fields to Southern California consumers was increased 150 MMcf when 3 new compressors went into operation at the Blythe compressor station.

Addition of the compressors—each rated at 1,760 hp—steps up daily capacity of the Texas-California pipeline to 705 MMcf. Both the line and the Blythe station are owned jointly by Southern California and Southern Counties Gas Companies.

The increase in capacity is almost equal to the line's 175 MMcf total daily delivery when first made operative in November, 1947.

Investment in the new compressors and an auxiliary gas engine driven generator was more than $1,500,000.

Liability insurance problems

Current MANAGEMENT Topic

LIABILITIES which may be imposed upon a gas utility and how to protect against them by insurance—self-insurance—and competent accident or loss prevention are vital in our industry.

The ideal program should include self-insurance of some risks and buying insurance for others. Even the largest utilities find it necessary to insure the possibility of certain risks. Generally, larger companies find it more advantageous—because of direct savings, better public- and employee-relations, and lower administration costs—to self-insure a substantial portion of primary liabilities. Smaller companies may find it advantageous to self-insure for smaller amounts.

Self-insurance is the absorption of all risk of financial liability resulting from particular exposures of the company. Generally, such a company will settle its own cases. In litigations, its attorneys defend the suit and it pays all costs including judgment.

Insurance is a contractual arrangement between the assured and the insurance company, whereby the insurance company undertakes to pay all legal liabilities resulting from specified exposures. Ordinarily, the insurance company provides claims service and attorneys.

A self-insurance program can generally be started out with a potential saving of 40% of premium, less administrative costs, if losses are projected over a period.

Contrary to belief of many, a gas utility does not, in long run, enhance public relations by paying claims where there is no legal liability, as people will lose respect for its management and consider it is wasting money. Experience indicates that promptness of investigation and decision on claims is an important factor in maintaining good public relations. Often, proper and prompt explanation of why a claim cannot be paid will enhance the company's public relations more than if the claim is paid after delay and procrastination. By self-insurance, the utility has claims handled by men familiar with industry-problems. They are able to act immediately in investigation and decision.

Liability in courts today is often a close question and a prompt compromise settlement of such cases is usually to the company's and the claimant's best advantage.

In considering its insurance program, the primary problem for each gas utility is to determine how large a loss it can safely absorb without financial embarrassment and to determine the likelihood and frequency of such loss. Such likelihood should be weighed over a substantial period; one unexpected loss should not be permitted to offset experience of a 5- or 10-year period. What to insure or self-insure and the limits of each vary and are determined by the size of the company, the assets which it has available, its concern regarding public relations and other factors.

One insurance consultant advocates answers to these questions before decisions can be made on self-insurance and insurance coverage:

1. Maximum potential single loss possibility.
2. If company did not incur severe losses in past, information from agent or broker on most severe losses suffered by other companies having similar exposures.
3. Spread of risk—number of physically-separated operating units exposed to the same risk.
4. If adjustment of losses would be in wide-spread areas and handling of adjustments would be impractical or uneconomical, it may not be advisable to assume risk.
5. Degree of controllability of risk through operation of effective loss or accident prevention program. Unless management agrees to support prevention program, assumption of controllable risk is usually not justified.
6. Actual losses for at least 5 most recent years in company.
7. Cost of purchased insurance for period.
8. Competent inspection service. Does company have it? What would be cost of developing inspection service?
9. Possibility of company handling adjustment of losses, satisfactorily and economically?
10. Management's preference for adjusting claims directly with employee or public—handle through an insurance company?
11. Existence of laws which prohibit assumption of risk.
12. Effect of tax laws on ultimate net cost when risk is assumed, compared with purchased insurance.

Practically no company, no matter how large, can afford to self-insure all its liabilities and excess coverage must practically always be considered as a part of any program of self-insurance. It is almost impossible to properly conduct a business without carrying substantial amounts of insurance even though primary limits are self-insured.

Generally, about $10,000,000 is the maximum that Lloyds of London will cover for bodily injury and property exposure for one corporation. American companies will ordinarily not cover such large amounts.

In recent years, the number of serious gas explosions and the general gas industry accident record have brought about a reluctance by American insurance companies to insure the utility industry. Because of this lack of interest in handling excess insurance coverage, most of the industry has placed excess liability insurance with Lloyds of London. Premiums quoted by Lloyds include a 7½% tax which American companies do not have to pay.

Lloyds is not a corporation. It is an association of individuals, each of whom assumes risks for himself alone, in the hope of making a profit.

Often, excess insurance may be placed, not in one policy, but in many. The first may bring the total limits up to $500,000, the second to $1 million, and the remainder in layers of $1 million each. As many as 1,500 or more members of Lloyds may be involved representing 80 or 90 syndicates.

Securing American markets for excess gas utility insurance became so acute that American Gas Association set up a committee to study the problem and report on alternatives—such as pooling resources of casualty companies, cost-plus insurance agreements, and even the formation of a new gas industry casualty company. During the past year there has been slight change in conditions, but not enough to predict a permanent trend. Four American insurance companies have evidenced some interest in certain excess insurance coverage of gas utilities. The AGA insurance committee has decided to recommend no affirmative action but to watch developments for the next year.

This is a condensation of a presentation by Raymond W. White, Pacific Gas and Electric Co., at Pacific Coast Gas Association's annual convention. For details, communicate with PCGA. Reference: Liability Insurance Problems.

Fair return for gas utility

Current REGULATORY Topic

A UTILITY is in competition for investors' money with other utilities and non-regulated businesses having comparable risks. Objectives are that investors will retain securities they now own; they will make purchases of securities between new issues; and they will buy large blocks promptly when new securities are offered. To develop financial vitality, therefore, a utility must pay a competitive return on bonds and stocks. To enable a utility to pay competitive returns on the investment

it is essential that the regulatory commission authorize it to charge compensatory rates for service.

The compensation which the Constitution guarantees must be sufficient to reimburse the utility for operating expenses, depreciation and taxes, plus a fair return. A fair return, being wages for use of invested capital, is as much part of cost of rendering service as wages for labor. The utility's fair return must meet contracted financial requirements of bonds and preferred stock, and economic obligation to pay competitive dividends on common stock while retaining some earnings.

The United States Supreme Court, more than thirty years ago in the *Bluefield Waterworks* case, announced the standard of finance to be used by commissions in authorizing fair utility return.

"A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties; but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility, and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties. A rate of return may be reasonable at one time and become too high or too low by changes affecting opportunities for investment, the money market, and business conditions generally."

Rate-making involves balancing of interests of consumers and investors. Utility regulation substitutes for competition. Legal principles governing rate-making are the outgrowth of economic facts. They seek to achieve reasonable prices and returns which would result from competition in the open market.

Fair return is a flexible concept, not a static rule. Current economic conditions are controlling, and since 1900 the Supreme Court has approved utility returns ranging generally from 6% to 8%, depending on the related economic cycle.

In establishing total dollar return to which a utility is entitled, regulatory agencies have multiplied the adopted utility property rate base by a selected percentage rate of return. Until recent years, excessive time and evidence were devoted to controversy over whether reproduction cost, or an original cost rate base reflecting accrued depreciation should be used. The importance of rate of return was overlooked even though increase in rate of return from 6% to 8% is equivalent to increase of $100,000,000 in valuation of a $300,000,000 utility property.

Many commissions, with meager evidence on measure of just return, have fixed return by intuition. Considering relative magnitude of rate of return element, it is essential that sound and carefully objective approach be employed in determination. The resulting compensation, to be fair, must be adequate to service bonded debt, pay preferred stock dividends, and provide earnings on common stock equity equal to that realized on other investments.

The measure of earnings required on the common stock equity, when investment-type rate base is employed, should not be confused with current cost of common stock money. Current cost of common stock money is indicated by relationship of available earnings to market price of stock, or dividend yield on market price. While these ratios indicate terms which new investors require, that does not mean they should measure return on investment in property already dedicated to public service.

Variation in over-all dollar return to meet changing economic conditions is a pragmatic requirement. Correlation with changes in economic conditions can be obtained by varying rate base or rate of return so that compensation authorized for the utility will harmonize with earnings in non-regulated enterprises. Rate base and rate of return must be expressed in consistent terms and units. If rate of return is developed from current or reproduction cost of capital, it should be applied consistently to a current-value rate base. The second approach is by analysis of earnings related to book investment.

One valid method of determining fair return: assume an investment-type rate base used by majority of regulatory commissions—original cost of utility's property less existing depreciation. Measure of fair return for representative natural gas distribution company requires (1) development of composite cost of money invested in utility and (2) addition of appropriate allowance for efficiency of management. Actual costs of utility's bonds and preferred stock are ascertainable from books, but evaluation becomes necessary to find the earnings required on the common stock equity component.

In *Hope Natural Gas* case, Supreme Court specified the standard by asserting that "the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital."

To produce the Court's criterion requires examination of operations and earnings of other comparable companies.

In authorizing rates of return for natural gas companies, utility commissions have recognized that such companies have greater risks than electric utilities, and are entitled to earn about a 0.5% higher rate of return. Manifest risks related to sources of supply and depleting natural gas resource, lower percentage of gross revenue remaining for operating income, higher relationship of purchased gas cost to gross revenue, lack of purchased-gas-cost automatic adjustment provisions in retail rates, inflexible characteristics of distribution pipeline system, fluctuations in revenue attributable to weather, and vulnerability to gas supply and retail market competition all produce greater risks to investors in retail natural gas industry than in electric utilities.

A regulatory body should make rates that are valid for longer than one future year used as the test period. Today, there is an inevitable decline in a utility's realized rate of earnings on property in service, because additions and replacements of facilities cost several times as much per customer as average cost of original property. This condition is aggravated in a growing utility. Some commissions have compensated for this erosion in earnings by allowing an additional amount in rate of return. In a recent natural gas rate case, the declining trend in rate of return was measured at 0.3% a year.

To enable a utility to earn the adopted fair return for more than one year, the regulatory agency must provide for this known-shrinkage due to high cost property which fails to be self-supporting under current utility rates. Many economists think that the present level of high prices is not likely to recede, so this problem will continue.

Regulatory commissions should be persuaded to promote the general public interest by practicing the preaching of the farsighted committee on corporate finance of National Association of Railroad and Utilities Commissioners.

This is a condensation of a presentation by Milford Springer, Southern Counties Gas Company of California at Pacific Coast Gas Association's annual convention. For details, communicate with PCGA. Reference: Springer, Fair Return.

Gas as textile tool

Current INDUSTRIAL APPLICATION Topic

WHILE the textile industry has been slower than others there has been a late strong trend to more extensive use of gas in new mills and in modernization of older mills.

Many factors underlie this increasing swing to gas. Foremost is the continuing discovery of new synthetic fibers and coatings. Invariably these modern fabrics and finishes require higher temperature for their curing or setting than can be achieved by steam at available pressures. Also, many plants are faced with shortage of steam for ordinary requirements. In both instances, the use of gas closes the breach. This principle of heat source at point of use is justified for many of the same reasons that individual electric motors replaced shafting to drive machinery.

Application of gas to textile process operations requiring heat fall in either of 2 general classes: 1. adaptation to existing equipment by direct full replacement, or simply boosting the heat supply already installed; 2. units initially and specifically designed for gas.

Operating data of some recent installations show such marked advances as to in-

dicate that much of today's equipment demands improvement or outright replacement.

SINGEING: This is readily accomplished by "burning off" the excess surface irregularities. This was no problem for gas with lighter fabrics. Heavier pile fabrics often called for 2 or more passes through the singe machine. Many mills still suffer the expenses of multiple passes without modern tools.

Eliminating multiple passes presents great savings in labor costs and increased production, with better quality. Several gas-fired equipment suppliers now have package units to properly singe, in one pass, any fabric presently known. For the great bulk of such materials a relatively simple design and moderate cost of burner equipment does an admirable job. These generally incorporate some form of a gas-fired radiant heat burner.

Extreme cases call for specialized attention. Here again, gas is applied by designers to aid the manufacturer to cut costs and improve quality.

Corduroy is one of these more difficult fabrics to singe. A unique singe machine design has been in very satisfactory operation for about 2 years. It produces an exceptionally uniform singe in a single pass on materials which had previously required 2 or more passes.

DRY BOXES OR OVENS: Some form of loop dryer, dry box or piece goods dryer is found in every textile finishing plant. Variations in material handling to accommodate particular textile characteristics do not affect the principles of heat application. Gas is used either as an auxiliary means of heat to augment steam coils or, more recently, as the full source of heat.

A good example of a gas designed loop dryer is in the double strand, 4-section machine, only 40' long. Gas is fired lengthwise of the dryer in a combustion tube, an integral part of the machine. Hot gases pass down the length of the combustion tube much in the manner of radiant-tube firing. The mill reports: fabrics cured at temperatures found impossible in previous steam-heated loop dryer, appreciable increase in production and improved quality.

TENTER FRAME DRYER: Two general types are in use, open or enclosed. Originally designed to stretch cloth to prevent shrinking in drying, it has recently come into wider use as device for setting as well as drying synthetic fabrics and coatings. Gas is rapidly coming into its own because drying and setting temperatures of many fabrics are in excess of normal steam temperatures found in textile plants.

Firing methods commonly employed for tenter frames are direct radiation and heated air streams.

Direct radiation through radiant burners placed directly beneath rapidly moving web of fabric makes simple, effective and rather inexpensive installation. Burners are mounted so that they may be raised and lowered, or swiveled to handle various widths of goods. Burner controls are interlocked with controls so that burners are turned off automatically whenever machine is stopped. Power failure or interruption in supply of air or gas will also shut off burners. Drying rates necessarily vary with different types of goods. Experience shows that average installations of radiant burners dry at rate of 2½-to-3 pounds of water evaporated per inch of burner length used.

Heated air streams incorporate a housing built over the frame. The heated air is introduced and rapidly circulated above, below, and through cloth and eventually exhausted to atmosphere together with moisture and volatiles.

NYLON SETTING: The setting of nylon and nylon fabrics can be likened to heat treatment. Threads of nylon after being woven are set or welded by heat. The temperature is in the neighborhood of 450F. Gas because of cleanliness, flexibility and form value is ideally suited for the process.

CAN DRYING OF COATINGS: Steam cans are generally used for drying textiles before dyeing and finishing and the drying and setting of coatings or laminations. Application of booster heat to provide additional drying capacity has been a problem due to usually limited space ahead of dry cans. Gas-fired radiant burners with high heat release in small area are a natural. A second advantage is to overcome tendency of foreign material to stick to first drying cans causing decreased production and increased maintenance.

CALENDER ROLLS: Calendering is process of passing fabric between heated steel rolls. There are many uses for the operation but most obvious are for imparting a shiny-to-highly glazed finish and for embossing cloth. Revived interest in gas-heated rolls is evident. Gas is used either by burners inside rolls or by direct application of surface heat. Most applications employ burners within rolls. Uniform heating over roll length is obtained by nichrome ribbon or screen tip type burners in preference to nozzle type.

In textile operations, volume of heat, temperature and method of application vary widely. The flexibility of gas equipment in design and application permits ready application for economical operation, increased production and improved quality.

This is a condensation of an information letter prepared for American Gas Association, by A. Ludwig, Public Service Electric & Gas Co. (N. J.). For details, communicate with AGA Industrial and Commercial Gas Section. Reference: Letter No. 66.

Steam for retail bakery

Current COMMERCIAL GAS SALES Topic

PROCESS steam is used by retail bakeries for:

1. Heating and humidifying dough, or in fermentation rooms.
2. Heating and humidifying proof boxes.
3. Oven steaming.
4. Heating steam-jacketed kettles.
5. Water heating.

Temperature of dough room should be about 80F with about 75% relative humidity. These conditions should be held constant for proper fermentation of dough and sponges.

Equipment manufacturers have recognized problem and have engineered units which will provide heat or refrigeration and required humidity.

Heat required for fermenting can be supplied by steam from process boiler. Quantities of steam required are small but the extra capacity needed should be considered when sizing process boiler.

One h.p. capacity for each 100 sq. ft. of floor in fermentation room should maintain proper temperature even though fermentation and baking may be carried on at same time.

In proof box, dough formed into loaves is processed by application of temperature and moisture to complete fermentation and set the product at desired point for flavor and quality.

By experimentation it has been found that 95F and relative humidity of 85% are ideal for producing high quality products.

To achieve desired condition in proof box, equipment manufacturers have provided a small air conditioning unit. As temperature and humidity depend on steam, this demand upon boiler must be incorporated in the size.

Steam at less than 20 lbs. pressure and in quantities of approximately 35 lbs. of steam per 500 cf of capacity should be provided.

Injecting steam into oven produces crisp crust or a soft crust for slicing as desired, more golden color, gloss, appetizing appeal and better quality. A consistent flow of controlled steam is needed either saturated or with entrained water not exceeding 1% and at pressure of 10 lbs. or less.

Steam is usually injected by a pipe with evenly-spaced drilled ports, the total area of which does not exceed 80% of cross-section of the distributing pipe.

Most bakeries find it necessary to precook fillings of pies and pastry before baking. In smaller bakeries this is often done in direct-fired kettles, but larger bakeries use steam-jacketed kettles.

All bakeries require a plentiful supply of hot water for cleaning and washing utensils, pans, mixers and other equipment coming in contact with foods, for maintaining spotless walls, floors, and fixtures in the production and sales areas, and for employee-use.

Water is often heated by steam-to-water heat exchanger. This eliminates separate direct-fired water heater.

Live steam may also be injected directly into pot sink to maintain desired water temperature for cleansing.

Steam is an absolute necessity in the modern bakery. Manufacturers of gas-fired boilers have recognized this fact and are in position to furnish equipment designed specifically for use intended. Gas lends itself beneficially and readily as fuel for automatically controlled boilers.

This is a condensation of an information letter prepared for American Gas Association by Sydney J. Cooper, Public Service Electric & Gas Co. (N. J.); M. L. Bradway, Springfield Gas Light Co.; John D. Haverkamp, New Orleans Public Service, Inc.; James W. Vance, Peoples Natural Gas Co. For details, communicate with AGA Industrial and Commercial Gas Section. Reference: Letter No. 67.

Old Days Recalled... from AMERICAN Gas Journal

ESTABLISHED 1859

90 YEARS AGO

October 1864

GAS FOOT WARMERS. *Many persons are greatly annoyed by cold feet; and although gas-stoves for heating apartments and cooking purposes are coming greatly into use, we find nothing introduced for foot-warming. Will not some enterprising manufacturer get up an article specially adapted for the feet. A nice little article made of porcelain, not much larger than a spitoon, would sell in this market very rapidly.*

OCTOBER 1864

IMPROVED STOVE. *Mr. Edwin A. Leland, N. Y., has just received Letters-Patent, dated Sept. 20, 1864, for an improvement in gas stoves for cooking purposes. The invention consists, firstly, in the construction of that part of the stove over the gas-burners with two plates, having a space between them; the upper plate having holes for the bottoms of kettles, or other utensils; and the lower one having corresponding holes by which the flame is concentrated under the bottoms of said utensils, and caused to act thereon with better effect than in the stoves heretofore in use. The improvement also consists in the employment, in combination with an oven in the rear of the gas-burners, of a descending flue, which conveys the heated products of combustion downward in front of the oven to the flue below, whence the products pass through a sheet flue under the oven, thence vertically upward through a flue behind the oven, and forward through a flue over the oven; thereby giving a circulation entirely around the oven, and heating the same more perfectly than is done in other gas-stoves.*

OCTOBER 1864

THE IRON AGE. *We have received the first number of a new weekly paper, which has the above title, and bears all the appearance of being conducted with a skillful hand. It is devoted to the Iron and Hardware interests. We wish the enterprising and talented projector success in his undertaking.—The subscription price per year is $4.*

50 YEARS AGO

October 1904

THE GAS MACHINERY COMPANY, Cleveland, has been awarded a contract for the placing in the works of the Hartford City (Conn.) Gas Light Company of a water gas apparatus equal to the producing of 1,500,000 cubic feet per day.

OCTOBER 1904

THE MILWAUKEE GAS LIGHT COMPANY has contracted with the Riter-Conley Manufacturing Company, Pittsburgh, for the construction of a storage holder, the rated capacity of which is put at 6,200,000 cubic feet. This holder capacity exceeds that of any other in America at the present time.

OCTOBER 1904

A PETITION for the formal dissolution of the Equitable Gas Light Company, of San Francisco, has been filed. And here is ended another chapter the pages of which reveal much of deceit and unscrupulousness.

OCTOBER 1904

THE COMPLETE LIST OF OFFICERS in the direction of the affairs of the Pacific Coast Gas Association for the ensuing year, is as follows: President, L. P. Lowe; Vice-President, John Martin, Secretary and Treasurer, John A. Britton.

OCTOBER 1904

THE GAS EXHIBIT at the World's Fair of the Western Gas Association has been awarded a Grand Prize by the Jury of Awards. Prizes of a similar nature were awarded to the Western Gas Construction, the Laclede Firebrick Manufacturing Company and the H. Mueller Manufacturing Company.

OCTOBER 1904

AT A RECENT MEETING of the proprietors of the American Improvement Company, Seattle, the avowed intention to supply gas in that city for 85 cents per 1,000 cubic feet was announced. Gas at 85 cents per 1,000 cubic feet in Seattle, it would seem to us, is not likely to attract the favorable attention of investors.

OCTOBER 1904

AT THE THIRTY-SECOND ANNUAL meeting, American Gas Light Association, held at Washington, D. C., October 19 to 21, an election for officers was entered into with the following result: President, Edward G. Cowdery; First Vice-President, Charles F. Prichard; Second Vice-President, Charles R. Faben; Third Vice-President, Alfred E. Forstall, Secretary and Treasurer, George G. Ramsdell.

OCTOBER 1904

WE ARE INDEBTED to the American Lava Company, Chattanooga, Tenn., for a copy of its well gotten up pamphlet on "Lava for Mechanical and Industrial Purposes."

25 YEARS AGO

October 1929

ROPER IN BROADCASTING CAMPAIGN. *Having proved the tremendous effects of radio advertising on the sale of its products, the Geo. D. Roper Corp., Rockford, Ill., has entered into a second year of broadcasting in connection with the Forecast School of Cookery, N. Y. . . . During the original 30-week period in which the school featured the Roper Gas Range in its broadcasting, 35,000 women mailed in requests for further information.*

AMERICAN

Gas Fundamentals

OUTLINE

NATURAL GAS
- *Geology
- *Drilling and completion
- *Methods of estimating reserves
- *Chemicals from gas
- *Natural gas conservation
- *Underground storage of natural gas

MANUFACTURED GASES
- *Coke oven gas; producer gas, blue gas, carbureted water gas
- *Reformed gas
- *Hi-Btu oil gas
- *Interchangeability of various fuel gases

LIQUEFIED PETROLEUM GASES
- *Sources, properties and uses

BASIC GAS LAWS
- *Perfect gases
- Supercompressibility

TRANSMISSION
- *Pipe lines
- *Corrosion and pipe protection
- *Compressor stations
- *Gas conditioning
- Flow formulae
- *Principles of orifice measurement
- Pipe coatings and protection methods
- *Pipeline and network gas dispatching

GAS STORAGE
- *Methods of storing gas

GAS DISTRIBUTION
- *System design and operation
- *Pressure regulation, part 1
- *Pressure regulation, part 2
- *Leak detection and control
- *Metering
- Measurement and accounting
- *Odorization
- Customer service
- *Gas dispatching in distributing utilities

GAS UTILIZATION
- *Principles of gas combustion
- *Competitive fuels, part 1
- *Competitive fuels, part 2
- Domestic
- Commercial
- *Industrial
- *Principles of absorption refrigeration
- *Industrial heat processing with gas

CONVERSION PRACTICES

MANAGEMENT PROBLEMS AND POLICIES
- *Corporate structure
- *Public utility regulation
- *Public relations
- Theories of rate making
- *Functions of the Land Department
- *Communications in the gas industry
- Personnel Management

GLOSSARY
- *Ab-to-Zon

***Chapters published since Jan. 1951.**

How to Use the Material

American Gas Fundamentals *is a comprehensive compilation of basic gas facts to guide any gas utility employee toward a broader understanding of the industry as a whole.*

The series is designed to be removed from each current issue of AMERICAN GAS JOURNAL *and filed in a ring binder where it may be accumulated into a text book of permanent usefulness. Material should be filed under the major subject head appearing in the upper right hand box at the head of each chapter.*

Gas Flow Formulas

BEFORE modern gas pipelines can be constructed, a vast amount of engineering must be completed and transposed to voluminous detailed drawings and specifications. The intricacies of this work have multiplied many times as transmission lines have become longer, their diameters have become greater, the volumes of gas have become enormous and the pressures have been stepped up far beyond the visualizations of the first pipeline builders.

The *Gas Fundamentals* chapter on "Transmission of Natural Gas" summarized the five fundamental factors that are given exhaustive consideration in the design of a new pipeline. They are:

1. Initial pressures. These are generally dependent upon the pressures of the gas in a given field or upon the pressures that are developed by compression.
2. Terminal pressures. These are the pressures required at the end of the pipeline or at the city gates, en route, where gas deliveries are made.
3. Maximum rate of flow. This is the maximum volume of gas estimated as required per day to meet the total demands of the markets being served. Even though that maximum or peak demand is made intermittently and for relatively short periods, the pipeline design must give consideration to it.
4. Line length. This, obviously, is the distance between the pipeline terminals.
5. Pipe diameter. This is the diameter of pipe that is required to deliver the maximum market demand for gas over a given distance, with given initial and terminal pressures.

The importance of the rate of flow, in the design calculations, are clear. The calculations incident to determining the flow rate are most influential in the subsequent success of the pipeline operations—from the viewpoints of efficiency and economy.

A number of methods have been devised for calculating the rate of flow of gas in pipelines. Some of these formulas have wider use than others. Some pipeline companies have developed their own formulas which they have found to meet their conditions with a somewhat higher degree of accuracy than more general formulas.

This chapter of *Gas Fundamentals* presents formulas that are used for high pressures and low pressures; consideration is given to the important effects of supercompressibility.

High Pressure Gas Flow

WEYMOUTH FORMULA. This is the best-known and most widely-used gas flow formula:

$$Q = 433.5 \frac{T_o}{P_o} \left[\frac{(P_1^2 - P_2^2)\, d^{16/3}}{GTL} \right] ½$$

where

- Q = flow cubic feet per day under standard conditions (P_o and T_o)
- d = internal diameter of pipe, inches
- T_o = standard absolute temperature °F
- T = temperature of flowing gas—absolute °F
- P_o = standard pressure, psia
- P_1 = initial pressure, psia
- P_2 = terminal pressure, psia
- G = specific gravity of gas, air = 1.0
- L = length of pipe line, miles

By assuming

- $T_o = 60 + 460 = 520°$ F
- $P_o = 14.73$ psia
- $T = 50 + 460 = 510°$ F

the Weymouth formula is simplified to:

$$Q = 676.2 \sqrt{\frac{(P_1^2 - P_2^2)\, d^{16/3}}{GL}}$$

or

$$Q = 676.2\, d^{5/2} \sqrt{\frac{P_1^2 - P_2^2}{GL}}$$

When the Weymouth formula for flow of gas in pipelines was introduced in 1912, the maximum working pressures in pipelines did not exceed 350-to-400 psi. The effects of deviations of actual gases from the ideal gas laws were not thought to be significant and were not recognized. The gas laws were discussed in a separate chapter, "Perfect Gases."

With the much higher pressures that are now usual in gas pipelines, it is essential to incorporate into the original Weymouth formula an allowance for supercompressibility to make it applicable to present practice.

This adjustment is relatively simple. Within the pressure range for which gas transmission lines are now designed, and at the average temperature of flowing gas usually encountered, natural gas follows a deviation pattern which may be represented by a straight line supercompressibility function of the pressure of

$$(1 + JP) = \frac{1}{Z}$$

By utilizing this relationship the modified Weymouth formula becomes:

$$Q = 433.5 \quad \frac{T_o}{P_o} \left[\frac{(P_1^2 - P_2^2)\, d^{5\,1/3}}{GTL} \right] ½ \quad (1 + JP_m) ½$$

and since

$$P_m = 2/3 \left[P_1 + P_2 - \frac{P_1 P_2}{P_1 + P_2} \right]$$

TABLE 1

VALUES OF $d^{8/3}$ AND $d^{16/3}$ FOR WEYMOUTH FLOW FORMULA

Note: $d^{8/3} = \sqrt{d^{16/3}}$

Diameter (d), inches			
External	Internal	$d^{8/3}$	$d^{16/3}$
2.375	2.067	6.933	48.063
3.500	3.068	19.87	394.99
4.500	4.026	41.02	1,682.6
6.625	6.040	121.0	14,640
6.625	6.125	125.6	15,773
6.625	6.250	132.5	17,567
8.625	8.071	262.1	68,700
8.625	8.125	266.8	71,182
8.625	8.185	272.1	74,035
10.000	9.625	419.2	175,710
10.750	10.192	488.3	238,440
10.750	10.250	495.7	245,760
12.750	12.090	770.0	592,870
12.750	12.188	786.7	618,920
12.750	12.250	797.5	635,930
14.000	13.500	1033.3	1,067,600
15.000	14.500	1250.2	1,563,000
16.000	15.250	1430.2	2,045,400
16.000	15.375	1461.7	2,136,500
16.000	15.500	1493.5	2,230,600
18.000	17.250	1986.6	3,946,500
18.000	17.375	2025.3	4,101,600
18.000	17.500	2064.3	4,261,400
20.000	19.250	2661.6	7,084,200
20.000	19.375	2707.9	7,333,000
20.000	19.432	2729.3	7,449,200
22.000	21.125	3410.4	11,631,000
22.000	21.375	3519.1	12,384,000
22.000	21.500	3574.1	12,775,000
24.000	23.125	4340.8	18,843,000
24.000	23.375	4466.8	19,953,000
24.000	23.500	4531.0	20,529,000
26.000	25.125	5415.4	29,326,000
26.000	25.500	5633.4	31,736,000
28.000	27.125	6642.3	44,120,000
28.000	27.500	6889.8	47,471,000
30.000	29.125	8030.0	64,482,000
30.000	29.500	8308.3	69,030,000

this reduces to

$$Q = 433.5 \frac{T_o}{P_o} \frac{d^{8/3}}{\sqrt{GTL}} [P_1^2(1 + \tfrac{2}{3} JP_1) - P_2^2(1 + \tfrac{2}{3} JP_2)]^{1/2}$$

with

P_m = Mean pressure of line, psia
J = Factor for supercompressibility.
Z = Reciprocal of $(1 + JP)$
r = Ratio of compressions = $\frac{P_1}{P_2}$

Refer to Table 1 for values of $d^{8/3}$ and $d^{16/3}$.

A simplified working formula applicable to general design problems can be derived from the general formula by assuming values for T_o, P_o, G and T which will approximate those to be anticipated in most cases and combining them into a constant, K:

$$K = 433.5 \frac{T_o}{P_o \sqrt{GT}}.$$

The factor J may also be assumed at a constant value that will apply to the majority of cases without serious error.

By using these values:

$T_o = 60 + 460 = 520$ deg. F
$P_o = 14.73$ psia (30" Hg.)
$G = 0.65$
$T = 50 + 460 = 510$ deg. F
$J = 0.00022$ per 1 psia

the value of K will be 840.5 and the working formula will be

$$Q = 840.5 \frac{d^{8/3}}{\sqrt{L}} [P_1^2(1 + 0.000147 P_1) - P_2^2(1 + 0.000147 P_2)]^{1/2}$$

For conditions other than those assumed above, K can be modified by multiplying by such of these factors, as appropriate:

$$\frac{T_o}{520}; \quad \frac{14.73}{P_o}; \quad \sqrt{\frac{0.65}{G}}; \quad \sqrt{\frac{510}{T}}.$$

If P_1 and P_2 are known, the simplest form of the formula in solving for Q, d or L is found by utilizing the ratio of compressions,

$$r = \frac{P_1}{P_2}$$

thus:

$$Q = K \frac{d^{8/3}}{\sqrt{L}} P_2 [(r^2 - 1) + \tfrac{2}{3} JP_2 (r^2 - 1)]^{1/2}$$

The simplest method of solving for P_1 or P_2 is:

1. From equation (2) or (3), solve for the value of the parenthetical term under the radical which contains the unknown pressure, $P^2 (1 + 2/3 JP)$. Call this C.

2. Select a trial pressure, P_a, preferably the round figure value nearest to the square root of C.

3. Solve for $C_a = P_a^2 (1 + 2/3 JP_a)$.

4. Select a second trial pressure, P_b, preferably a round figure nearest to the square root of .8C to .85C, and solve for $C_b = P_b^2 (1 + 2/3 JP_b)$.

5. Solve for the unknown P from

$$P = P_b + \frac{C - C_b}{C_a - C_b} (P_a - P_b)$$

being sure to do it algebraically, in case the selection of P_b should make C_b greater than C.

The computations are easily and quickly made on the slide rule with sufficient accuracy to satisfy most design problems encountered in practice, and within the range of precision fixed by other factors involved.

A line composed of several lengths L_1, L_2, etc., of diameters d_1, d_2, etc., can be transformed into a single equivalent line of uniform diameter d_o, by determining the equivalent length of each individual section by means of the formula

$$L_{o\,1} = L_1 \left(\frac{d_o}{d_1}\right)^{8\,1/3}$$

and adding these equivalent section lengths together to form an equivalent line of diameter d_o and total length L_o.

To transform a length of pipe of diameter d and length L, to a pipe of equivalent capacity having a length L_o, the diameter of the equivalent section will be

$$d_o = d\left(\frac{L_o}{L}\right)^{5/16}.$$

The diameter of a single pipe having a capacity equivalent to the aggregate capacity of several parallel, or looped lines of a common length and of diameters d_1, d_2, etc., is equal to

$$d_o = [d_1^{8/3} + d_2^{8/3} + \text{— etc.,}]^{3/8} = [\Sigma\, d^{8/3}]^{3/8}.$$

If several loops have different lengths, actual diameters of the loops must first be transformed into equivalent diameters of pipe having a common length, and these equivalent diameters then be added in accordance with the formula just given.

For general use, the formula can be still further simplified by combining the K and d factors into a single constant, $A = Kd^{8/3}$, and using a table of values for A, in Table 2. for the principal sizes and weights of pipe in common use. The table gives values of A for the constants assumed above and for pipes up to and including 30" O.D. Then the equation

$$Q = 840.5\,\frac{d^{8/3}}{\sqrt{L}}\,[P_1^2(1+0.000147\,P_1) - P_2^2(1+0.000147\,P_2)]^{1/2}$$

becomes

$$Q = \frac{A}{\sqrt{L}}\,[P_1^2\,(1 + 0.000147\,P_1) - P_2^2\,(1 + 0.000147\,P_2)]^{1/2}$$

Mean Pressure in Pipeline

The formula used in determining the mean pressure, P_M, in a pipeline is:

$$P_M = \tfrac{2}{3}\left(P_1 + P_2 - \frac{P_1 P_2}{P_1 + P_2}\right)$$

Supercompressibility Factor

If a flow formula, which does not reflect deviations from ideal gas law, is used for problems involving pressures above 200 psi, its results may be corrected by applying the following supercompressibility factor

$$\text{Supercompressibility Factor} = \sqrt{1 + .0002P_M}$$

Panhandle Formula

This formula is used by many companies for the calculation of gas flow in transmission lines that have diameters of 12" or more:

$$Q = 435.87e\left(\frac{T_o}{P_o}\right)^{1.07881}\left(\frac{(P_1^2 - P_2^2)}{G^{0.8539}\,T_f L}\right)^{0.5394} d^{2.6182}$$

where

T_o = Base temperature = 60° + 460° = 520° abs
P_o = Base pressure = 14.73 psia
T_f = Flowing temperature = 50° + 460° = 510° abs
G = Gravity of gas = 0.686 (Panhandle gas)

and where

P_1 = Initial pressure—psia
P_2 = Final pressure—psia
L = Length of line in miles
d = Diameter of pipe in inches
e = Experience factor

TABLE 2

"A" FACTORS FOR VARIOUS PIPE SIZES

Size (inches)	Wall Thickness (inches)	Inside Diameter (inches)	"A"
Nominal			
1	.133	1.049	954.6
1½	.145	1.610	2,992.
2	.154	2.067	5,826.
3	.216	3.068	16,700.
4	.237	4.026	34,470.
5-3/16	.304	4.892	57,950.
6	.280	6.065	102,800.
6⅝	.275	6.450	121,100.
8	.322	7.981	213,800.
8	.277	8.071	220,200.
O.D.			
8⅝	.250	8.125	224,200.
I.D.			
10	.365	10.020	392,100.
O.D.			
10¾	.3125	10.125	403,200.
10¾	.250	10.250	415,200.
12	.375	11.250	534.000.
12	.250	11.500	566.200.
12¾	.375	12,000	634,200.
12¾	.3125	12.125	652,000.
12¾	.250	12.250	670,100.
14	.375	13.250	826,000.
14	.3125	13.375	847,000.
14	.250	13.500	868,300.
16	.375	15.250	1,202.000.
16	.3125	15.375	1,224,000.
16	.250	15.500	1,255,000.
18	.375	17.250	1,669,000.
18	.3125	17.375	1,701,000.
18	.250	17.500	1,735,000.
20	.375	19.250	2,237,000.
20	.3125	19.375	2,275,000.
20	.250	19.500	2,314,000.
22	.375	21.250	2,911,000.
22	.3125	21.375	2,957,000.
24	.375	23.250	3,700,000.
24	.3125	23.375	3,753.000.
26	.375	25.250	4,611,000.
26	.3125	25.375	4,672,000.
28	.375	27.250	5,650,000.
28	.3125	27.375	5,720,000.
30	.375	29.250	6,825,000.
30	.3125	29.375	6,903,000.

the equation can be resolved to:

$$Q/d^{2.6182} = 839.51e\left(\frac{(P_1^2 - P_2^2)}{L}\right)^{0.5394}$$

Clark Formula

$$Q = \frac{80.8}{\rho_o \mu^{0.9514}}\left[\frac{D^{4.55}\,M\,(P_1^2 - P_2^2)}{L\,Z_{av}\,T}\right]^{0.541} E$$

where

Q = Quantity of gas transported in cubic feet per day measured at P_o and T_o.

ρ_o = Density of gas, pounds per cubic foot at P_o and T_o
μ = Absolute viscosity of gas, pounds per foot-second.
D = Inside diameter of pipe, inches.
M = Molecular weight of gas, pounds per mole.
P_1 = Discharge pressure from compressors, lbs. per sq. in. abs.
P_2 = Suction pressure to compressors, lbs. per sq. in. abs.
L = Distance between compressor stations, miles.
Z_{av} = Average deviation factor.
T = Flowing temperature, °R.
E = Experience factor for adjustment of formula.

For any gas line normally handling the same type of gas at approximately constant temperature, the equation may be simplified by combining into a single term the expression for gas density, gas viscosity, molecular weight, temperature, and numerical constant. Under normal conditions, the viscosity term will not influence results greatly, because a 30% change in absolute value of viscosity will cause only about 2.7% change in the computed quantity of gas flowing. When gas viscosity is determined for an operating line, small variations from the conditions under which it was determined will not influence the accuracy of the equation appreciably. The condensed form of the equation is then:

$$Q = K_2 \left[\frac{D^{4.85} P_1^2 (1 - 1/Cr^2)}{L Z_{av}}\right]^{0.541} E,$$

where $K_2 = \frac{80.8}{\rho_o \mu^{0.0814}} \left[\frac{M}{T}\right]^{0.541}$,

and Cr = Compression ratio, P_1/P_2.

Low Pressure Gas Flow

For distribution system problems, the Spitzglass formulas are used. The formula for pressures that do not exceed 1 psig is:

$$Q = 3550\, K \left(\frac{h}{S L}\right)^{1/2}$$

where:

Q = Flow per hour in cubic feet of gas at 14.73 psia (30" Hg.) and 60° F.
H = Pressure drop in inches of water column.
S = Specific gravity of gas. Air = 1.0
L = Length of pipe in feet.
d = Internal diameter of pipe in inches.

$$K = \left(\frac{d^5}{1 + \frac{3.6}{d} + 0.03d}\right)^{1/2}$$

The formula for pressures that exceed 1 psig is:

$$Q = 4830K \left(\frac{Pa}{SL}\right)^{1/2}$$

where:

Q = Flow per hour in cubic feet of gas at 14.73 psia (30" Hg.) and 60° F.
P = Pressure drop between pipe terminals in pounds psi.
a = Average pressure in pipe line, pounds psia (absolute initial pressure minus half the pressure drop).
S = Specific gravity of gas. Air = 1.0
L = Length of pipe in feet.
d = Internal diameter of pipe in inches.

$$K = \left(\frac{d^5}{1 + \frac{3.6}{d} + 0.03d}\right)^{1/2}$$

The values of $\sqrt{d^5}$ are given in the accompanying Table 3.

TABLE 3
VALUES OF $\sqrt{d^5}$ FOR SPITZGLASS FORMULAS

Internal Diameter (d) (inches)	$\sqrt{d^5}$
.75	.4871
.824 (¾" pipe)	.6163
1.000	1.000
1.049 (1" pipe)	1.127
1.38 (1¼" pipe)	2.237
1.50	2.756
1.61 (1½" pipe)	3.289
2.00	5.657
2.067 (2" pipe)	6.143
2.469 (2½" pipe)	9.579
3.00	15.59
3.068	16.49
4.00	32.00
4.026	32.52
6.00	88.18
8.00	181.0
10.00	316.2
12.00	498.8
16.00	1024.
20.00	1789.
24.00	2822.
30.00	4930.
36.00	7776.

This Chapter on Gas Flow Formulas was compiled by the editors of American Gas Journal

There's No Business Like The *GAS* Business

. . . and we're mighty proud to be part of it

As equipment manufacturers, we never cease to marvel at the smooth dispatch with which the gas industry's product is produced, distributed and sold.

In the gas business, production lines must run endlessly. Product quality must be maintained at an exceptionally high level. To attract users, the product, gas, must be "packaged" and merchandised through modern, efficient appliances. All this takes unusual skills—management, technical, operational and selling skills of the highest order plus the close cooperation of able suppliers.

From long association we have learned there is no group more dedicated to public service than the gas utility companies. It is to their credit that the gas business has prospered and become one of the nation's great industries; one that continues to grow.

The gas business has been good to us. We like to think we have been good for the industry. Certainly Rockwell meters, regulators and Rockwell-Nordstrom valves have made important contributions to the safe, efficient handling of this fuel. We consider it our obligation to keep the development of our products and services ahead of the day-to-day needs of the industry. It is our privilege—a gratifying and rewarding one—to further the advance of a great industry it is our good fortune to serve.

INDUSTRIAL · COMMERCIAL · RESIDENTIAL · GAS

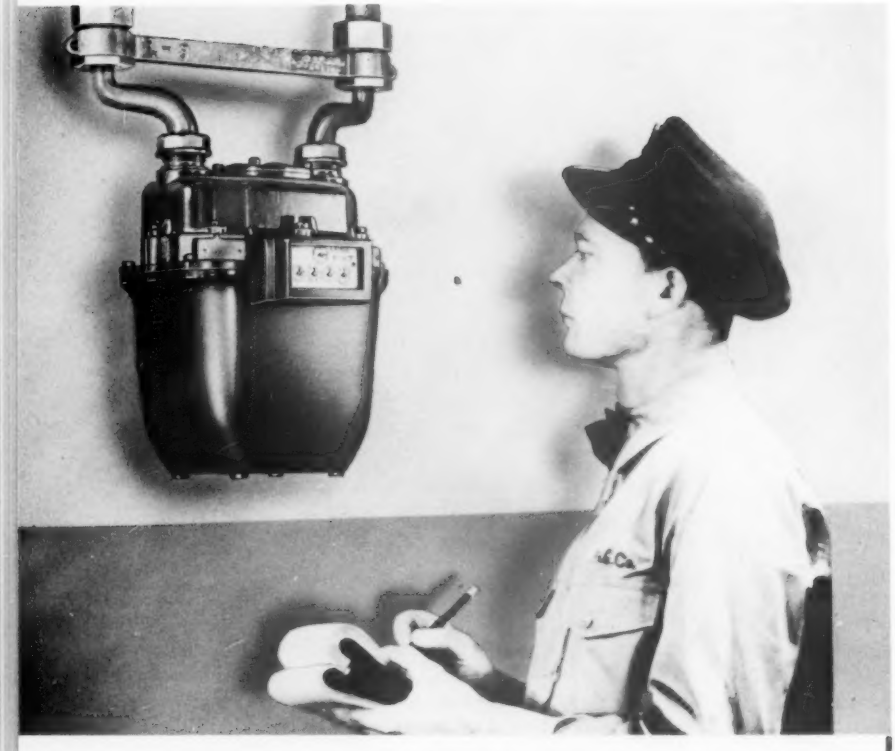
ROCKWELL PROGRESS REPORT . . . 1954

ROCKWELL

1954

Rockwell Progress

A QUICK REVIEW OF WHAT'S



Better Public Relations Start Here WITH ACCURATE, MODERNLY STYLED ROCKWELL ALUMINUM METERS

In 1946 Rockwell pioneered the use of lightweight, sturdy, pressure cast aluminum alloy for meter cases. New aluminum meter models have been continually added to the line. All have the benefit of mechanical improvements that result in a greater measure of sustained accuracy and long trouble-free operation. All are engineered to ease the burden of repair and maintenance; to lower measurement costs.

We have consciously styled the appearance of new Rockwell aluminum meters to match their superior performance qualities. Their modern, eye appealing lines win customer acceptance and give the desired impression of better service from the use of the finest, safest equipment.

Rockwell No. 415

Rockwell No. 150

Rockwell No. 1

Rockwell No. 175

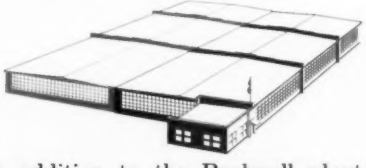
There's A Rockwell Aluminum Meter For Every Home, Shop or School

New Sales Offices Opened

Rockwell has opened the doors and laid out welcome mats at three new sales office locations. Fully staffed facilities have been established at Dallas, Philadelphia and Charlotte, N. Carolina. They reflect the increased business activity in these areas.

There are now 14 Rockwell sales offices, spread from coast to coast to give the best possible service to customers.

Regulator Production Centered in Norwalk

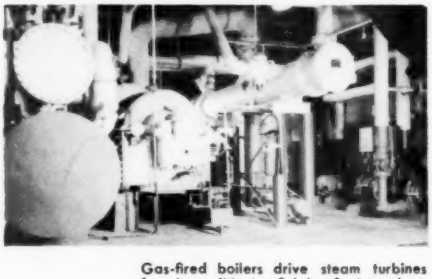


An addition to the Rockwell plant in Norwalk, Ohio, which almost doubled the size of the existing building, has now permitted the transfer of all gas pressure regulator production to this one point. The advantages of having related product lines built in one plant are obvious.

Instrument Production Grouped

A further step towards the consolidation of similar production at a single location has resulted from the transfer of gas industry instrument production to Tulsa. This plant now produces all Rockwell orifice meters, integrators and chart drives. It is located conveniently close to the Southwest gas producing areas.

We Practice What We Preach



Gas-fired boilers drive steam turbines for air conditioning Sulphur Springs plant.

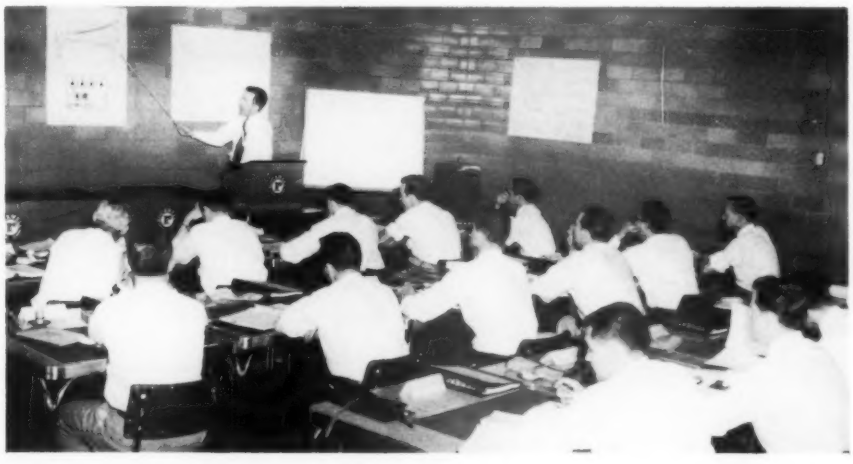
The new Rockwell plant in Sulphur Springs, Texas, is completely air conditioned with gas-fired equipment. This plant produces certain types and sizes of Nordstrom valves. It also serves as a warehouse for other Rockwell products. Over 300 Nordstrom valves are installed on the lines required to operate this factory.

Report - 1954

HAPPENING AT ROCKWELL

World's Largest Test Station Opened

For many years Rockwell has maintained separate facilities for field testing products made for the gas industry. Now, through the expenditure of nearly half a million dollars these facilities have been greatly extended to cover intensified research on all kinds of fluid flow. The new Rockwell test station is without a doubt the largest and finest of its kind. In it meters, regulators and valves are pre-proved under actual field operating conditions to insure their accuracy and durability on all manner of services. Included in this plant are separate runs for testing LPG meters.



Sales Training Schools Conducted

Because of the technical nature, as well as the wide scope of the measurement and control equipment made by Rockwell, it is important that the Company's sales engineers keep abreast of developments in the industry.

This objective is being accomplished through organized training programs in which young men of promise are brought into the Company and, under the tutelage of department heads, oriented in product data and application that will benefit customers.

Company sponsored schools for new employees, as well as refresher courses for the older experienced employees, are all part of this far reaching Rockwell policy.

WHERE GOOD FRIENDS CAN MEET

At the A.G.A. Convention, Atlantic City

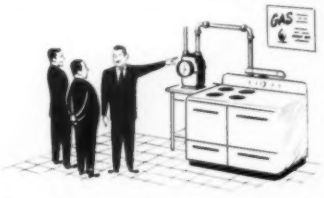
We at Rockwell look forward each year to the annual convention. We are proud of the many lasting friendships that our active participation in A.G.A. affairs has made possible. We hope to see you there. Visit our convention headquarters at the Traymore Hotel. Our facilities are at your disposal. Feel free to make the most of them.

Interesting Facts About Rockwell Products...

Valve Lubricants In Tubes

Lubricant for many Nordstrom valve services now comes in easy to handle tubes. To lubricate you simply insert the tube spout in the valve shank and squeeze the tube until the lubricant chamber is filled.

Demonstrations Made Easy

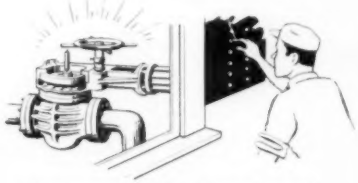


For sales and laboratory work Rockwell makes two styles of test or demonstration meters. These are fitted with large, easy to read dials and hands.

Improved Integrator Design

For years the Rockwell Integrator has provided the only method for mechanically computing the total reading from orifice meter charts. Now this accurate machine has been restyled by a prominent industrial designer and many new operational improvements have been added.

New Word For Old Practice



"Automation" is the new word for time and labor saving mechanical operation of industrial components. The ease and economy of remote push button control has been available to Nordstrom valve users for years in either cylinder or electric motor types.

ROCKWELL

Aluminum Meters

Tin Meters

Cast Iron Meters

Pressed Steel Meters

Orifice Meters

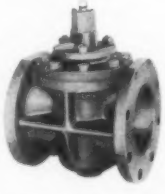
Service Regulators

Industrial Regulators

"1001" Regulators

Balanced Valve Regulators

Nordstrom Service Cocks



Nordstrom Standard Valves

Nordstrom Hypreseal Valves

Rockwell has the most complete line of measurement and control equipment

Rockwell has grown up with the gas industry . . . has a tremendous stake in its welfare and progress . . . has expanded steadily through the years to supply essential equipment *when* and *where* needed.

Look *to* Rockwell for engineering that has set the standards for the industry . . . for better performing products that last longer and cost less to maintain.

Look *at* Rockwell as a competent, soundly entrenched supply source—a company genuinely concerned with the gas industry's broader objectives of providing better gas service to more homes and industries.

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AMERICAN
Gas Journal

GAS FLOW COMPUTERS

FOR LOW PRESSURES

Cubic feet of gas per hour.....10 to 500M
Pipe diameters.....¾" to 48"
Pressure loss (inches)..... .01 to 10
Specific gravities.....1.5 to .35
Constants.....1400 to 1000
Pipe length (feet).....30 to 30,000

FOR HIGH PRESSURES

Cubic feet of gas per hour.....100 to 10MM
Pipe diameters.....¾" to 30"
Difference in absolute pressure to.....500 psi.
Sum of absolute pressures.....20 to 2,000 psi.
Specific gravities.....1.5 to .35
Pipe length (feet).....100 to 5,000
Pipe length (miles).....1 to 250

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AMERICAN Gas Journal

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News of the Gas Industry

AGA-PCGA TO HOLD JOINT CONVENTION IN LOS ANGELES IN 1955

At the general convention committee meeting in Los Angeles, left to right, sitting: Guy W. Wadsworth, president, Southern Counties Gas Co.; F. M. Banks, president, Southern California Gas Co.; E. D. Sherwin, president, San Diego Gas & Electric Co.; Robert A. Hornby, executive vice president, Pacific Lighting Corp.; James S. Moulton, vice president, Pacific Gas & Electric Co. Standing: N. Henry Gellert, president, Seattle Gas Co.; Kurwin R. Boyes, secretary and convention manager, American Gas Association; Clifford E. Johnstone, managing director, Pacific Coast Gas Association; R. R. Blackburn, vice president and secretary, Southern California Gas Co. and chairman 1955 general convention committee; John E. Kern, assistant manager, Pacific Coast Gas Association; Roy T. Richards, general supt., Arizona Public Service Co.; Frank B. Wright, vice president, Southern Counties Gas Co.

The 37th annual convention of American Gas Association, scheduled for October 17, 18, and 19, 1955, in Los Angeles, will have its meetings held in conjunction with Pacific Coast Gas Association, which has decided to forego its own separate convention in 1955. This combined event will be officially designated as the 1955 convention of American Gas Association and Pacific Coast Gas Association. The PCGA will hold its constitutional annual meeting during the convention.

The first meeting of the 1955 general convention committee was held in Los Angeles on August 11 under the chairmanship of Robert R. Blackburn, vice president and secretary, Southern California Gas Co.

Attending the meeting were: N. Henry Gellert, president, Seattle Gas Co.; Clifford Johnstone, managing director, PCGA; James S. Moulton, vice president and executive engineer, Pacific Gas & Electric Co.; Roy T. Richards, general superintendent, Arizona Public Service Co.; Emery D. Sherwin, president, San Diego Gas & Electric Co.; Frank B. Wright, vice president, Southern Counties Gas Co. of California; J. Edmund Kern, assistant manager, PCGA; and Kurwin R. Boyes, secretary, AGA. Mr. Boyes will serve as convention manager, and Mr. Kern has been named associate convention manager.

The general convention committee is responsible for transportation, housing, schedule and location of events, budgets, costs, registration, fees, social events, and other important phases of the convention planning.

At the meeting, Mr. Blackburn announced that the convention committee would be assisted in obtaining outstanding speakers through a special program committee headed by Robert A. Hornby, executive vice president of Pacific Lighting Corp. The committee consists of Eskil I. Bjork, president, The Peoples Gas Light & Coke Co.; D. A. Hulcy, president, Lone Star Gas Co.; and J French Robinson, president, Consolidated Natural Gas Co.

Four other important committee appointments were announced:

Frank N. Seitz, general sales manager, Southern Counties Gas Co. of California, heads a local committee to plan and conduct social events.

Frank M. Foster, general sales manager, Southern California Gas Co., is chairman of a properties committee.

Carl A. Renz, manager of special services, Southern California Gas Co., is chairman of the local transportation committee.

George S. Coates, manager of the customers department, Southern Counties Gas Co. of California, is local representative handling registration.

At the initial meeting, the committee also decided to solicit member companies in the near future to determine how many delegates will be sent to the 1955 convention.

The next meeting of the general convention committee is scheduled for December 7, in San Francisco.

Nevada Southern Buys Las Vegas Co

Nevada Southern Gas Co. has purchased the distribution system of Las Vegas (Nev.) Gas Co. Harold G. Laub, president of Southwest Gas Corp., Cal., and president, Nevada Natural Gas Pipe Line Co., is president of Nevada Southern; William M. Laub is vice president.

Chester A. Blackburn

Chester A. Blackburn, former vice president and director of manufacturing for Perfection Stove Co., died September 12.

Mr. Blackburn, who retired in 1951, was associated with Perfection for 33 years. He entered the company in 1918 as foreman of the enameling department. In 1938 he was named works manager and in 1947 was elected director of manufacturing.

Raymond Little

Raymond Little, sales promotion director of Gas Appliance Manufacturers Association and a leader in gas industry activities for many years, died September 12, at the age of 54.

Before joining GAMA on January 1 of this year, Mr. Little was associated with Equitable Gas Co. in Pittsburgh for 27 years. From 1945 through 1953 he was general sales manager of the company. During his time with Equitable he took an active part in gas industry activities, serving on many committees of American Gas Association. He was chairman of the residential gas section, house heating and air conditioning committee and the architects and builders committee. He served also as a member of the advertising committee and the refrigeration committee.

Mr. Little at one time worked for Duquesne Light Co., and later was employed at the Duquesne works of U. S. Steel Co., on combustion and fuel engineering problems. He joined Equitable in 1926 as an industrial sales engineer and subsequently held supervisory and management positions, including supervision of commercial sales and heating sales, direction of heating sales, and management of commercial sales and utilization.

Martin C. Madsen

Martin C. Madsen, chief engineer for Northern Natural Gas Co. since 1944, died September 4 at the age of 61.

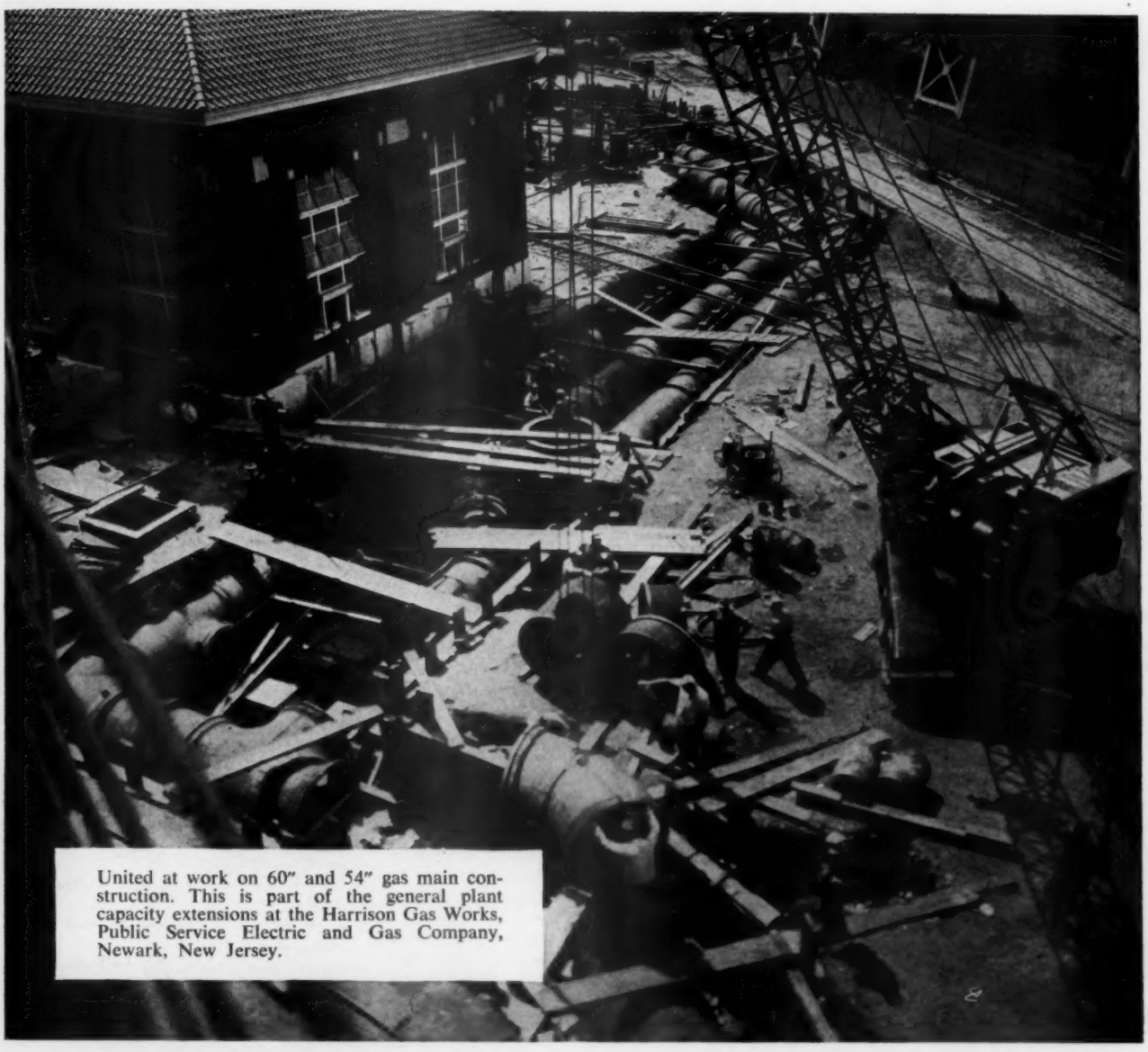
Prior to joining Northern Natural, Mr. Madsen was with Continental Construction Corp. (now Natural Gas Pipeline Company of America) where he was in charge of design and construction of all compressor stations on the original pipeline system between Fritch, Tex., and Chicago.

Mr. Madsen was affiliated with American Gas Association, Midwest Gas Association and Independent Natural Gas Association.

PG&E-Coast Counties Merger Final

Merger of Coast Counties Gas and Electric Co. into Pacific Gas and Electric Co. was completed recently when PG&E filed a certificate of ownership. The filing, in Sacramento, Cal., was the final step in a process of consolidating the two utility properties which began late last year. During the process PG&E acquired sole ownership of Pacific Public Service Co. and its subsidiaries, of which Coast Counties is the principal, and procured the necessary approvals of State and Federal regulatory agencies.

A total of 139,283 gas, electric and water customers of Coast Counties became



United at work on 60" and 54" gas main construction. This is part of the general plant capacity extensions at the Harrison Gas Works, Public Service Electric and Gas Company, Newark, New Jersey.

All 4 major construction needs of gas companies

These construction needs are met by United's complete and flexible engineering and construction services for operating gas companies—which include a gas main and pipe-line construction inspection service to assist with distribution system extensions.

1. GAS MAINS AND PIPE LINES. Pipe lines—distribution mains—water and river crossings. Construction—construction inspection — construction management.

2. OIL GAS SETS. Heavy oil regenerative apparatus—new and converted apparatus for light oil — light oil recovery plants — oil gas plants and auxiliaries.

3. C.C.R. PROCESS.* Produces low and high gravity city gases, synthesis gases, gases of sendout heating values from 700 to 1,000 Btu — using natural gas, L. P. gases, gasoline, naphtha, or kerosene.

4. GENERAL PLANT EXTENSIONS. Through the years United has built up large, well organized forces for handling general plant extensions for both natural gas and other plant equipment.

The services provided by United are flexible and may be adjusted in scope to meet your specific needs. No matter what your project, we invite you to share our experience and facilities as designers, contractors, and consulting engineers.

*Patents Pending

UNITED ENGINEERS & CONSTRUCTORS INC

NEW YORK 17 PHILADELPHIA 5 CHICAGO 2

WITH A BACKGROUND OF OVER SEVENTY YEARS' EXPERIENCE

PG&E customers as a result of the merger. Continuity of utility customer service was not affected by the change, the properties already being interconnected.

Jack K. Horton, former president of Coast Counties and also of the Pacific Public Service Co., has been made a vice president of PG&E. Other Coast Counties executives, as well as all other employees, have been integrated into the organization.

Wall Is Exec VP of Pioneer Natural

C. I. Wall has been named executive vice president, Pioneer Natural Gas Co., by the board of directors. Prior to his appointment, Mr. Wall was vice president of the company. He served as president of the West Texas Gas Co. before the consolidation of the companies that now make up Pioneer Natural.

C. I. Wall

Mr. Wall began working for West Texas Gas in 1927, shortly after the company was organized, and this year completed his 27th consecutive year with the industry. His varied positions have included new business manager; assistant purchasing agent; purchasing agent; superintendent of city plants; vice president in charge of operations and president and director of West Texas Gas.

Mr. Wall is currently serving as president of Southern Gas Association.

Bklyn Boro Gas Names Slogan Winner

"Make every day safety day" won over 200 entries in a slogan contest sponsored among employees by Brooklyn Borough Gas Co. The contest was one of the features in a continuous drive to maintain a top safety record.

Mrs. Anna L. Russo, winner of the contest, is employed in the customers' service department of Brooklyn Borough, a company which rolled up a no lost time accident record in all departments during June and July.

As a public service reminder, the winning slogan is being sent out on the company's automotive equipment through the area it serves.

DeGolyer on Dresser Industries BofD

E. L. DeGolyer, petroleum geologist and oil executive, has been elected to the board of directors of Dresser Industries, Inc., manufacturers of oil, gas and chemical equipment.

Dr. DeGolyer, one of the world's outstanding geologists, is a senior member of the consulting firm of DeGolyer & MacNaughton, Tex.

TGT-Tenn Prod Boards Vote Merger

The boards of directors of Tennessee Gas Transmission Co. and its affiliate, Tennessee Production Co., have approved a proposal to merge the production company into the transmission company and special stockholders' meetings for the firms were called for October 6 to vote on the merger.

On obtaining stockholder approval, Tennessee Gas and Tennessee Production will immediately file a joint application with Federal Power Commission for approval, officials said.

600 Attend Appalachian Short Course

More than 600 representatives of the gas, oil and chemical industries attended the 14th annual Appalachian gas measurement short course held at West Virginia University, Morgantown, August 23 to 25.

Over 30 manufacturing concerns displayed the latest developments in the field of measurement and regulation at the course, where 84 classes and 4 open forums were conducted.

Highlighting the opening session were addresses by Mark V. Burlingame, vice president, Natural Gas Pipe Line Co. of America and Texas-Illinois Gas Pipe Line Co.; and Homer W. Hanna, Jr., West Virginia Public Service Commission.

Mr. Burlingame spoke on This Gas Industry, explaining the industry's size, its problems and its present need for storage fields and methods of utilization, while Mr. Hanna explained the functions of public service commissions.

C. G. Moorhead, Hope Natural Gas Co., chairman of the general committee, officially opened the short course, and the address of welcome was made by Dr. Irvin Stewart, president of the University.

Howard S. Bean, National Bureau of Standards, was appointed program chairman of the 1955 short course, and A. M. Hutchison, Ohio Fuel Gas Co., will assume the chairmanship of the general committee.

Billups Is Tropical Gas Co Pres

Fred H. Billups has been named president and chief executive officer of Tropical Gas Co., a newly formed company presently operating in Bermuda, Puerto Rico, Dominican Republic, Haiti, Jamaica and the Central America countries. Mr. Billups will take office October 1, when he resigns from Esso Standard Oil, S.A., an affiliate of Standard Oil of New Jersey. He has been with that organization for 26 years.

The new president is joining Tropical Gas to guide the development and expansion of its business into diversified fields of activity and into new areas of operation.

50 Miles of 36" Pipe for Transcon

Consolidated Western Steel div., U.S. Steel Corp., recently started producing 36" diameter pipe at its Orange, Tex., plant. The division's first order for this diameter pipe is for 50 miles of pipe for Transcontinental Gas Pipe Line Corp. Transcontinental has the giant pipes scheduled for installation near Tylertown, Miss., and Billingsly, Ala.

PG&E Gas Import Project Completed

The capacity of Pacific Gas and Electric Company's transmission main to bring in out-of-state natural gas was increased to 700 MMcf daily when the last section of an expansion project was recently completed.

The new addition was completed when a valve was opened which allowed gas to flow through a 27-mile section paralleling the main 34-inch line. This job climaxed the installation of a series of loops along 284 miles of the 502-mile route of the original line.

HOW ROCKWELL TESTS ROTOCYCLES

ENGINEERS keep a close watch on the accuracy of this experimental predetermining valve mounted on a 6" Rotocycle being operated at various rates of flow at Rockwell Manufacturing Company's new meter and valve testing station near Pittsburgh. Two Rotocycles in the background are undergoing tests to determine life expectancy. They are operated 24 hours a day at 25% over their rated capacity, with each meter handling over one-quarter million gallons of gasoline every 8 hours. Tests like these, under field conditions, are standard practice at the testing station, which was designed for the purpose of experimenting with and testing the various Rockwell meters and valves used for measuring and controlling fluid products.

PCGA OFFICERS: 1954-1955

At the Pacific Coast Gas Association's 61st annual meeting in Vancouver, which had a total registered attendance of 678, these officers were elected for 1954-1955:

E. D. Sherwin, San Diego Gas & Electric Co., president

Guy W. Wadsworth, Southern Counties Gas Co., vice president

Harry McGann, Pacific Gas and Electric Co., treasurer

Clifford Johnstone, managing director

J. E. Kern, assistant manager

The directors are:

P. E. Beckman, Pacific Gas and Electric Co.

J. F. Bell, Portland Gas & Coke Co.

A. E. Englebright, Honolulu Gas Co.

W. M. Jacobs, Southern California Gas Co.

W. C. Mainwaring, British Columbia Electric Co.

J. F. Ray, General Controls Co.

J. D. Roberts, Mountain Fuel Supply Co.

W. R. Smith, Sr., Continental Water Heater Co.

C. M. Sturkey, Seattle Gas Co.

At the same time, the following were named general chairmen:

J. L. Liecty, Arizona Public Service Co., accounting section

J. F. Ray, vice president, General Controls Co., manufacturers section

P. R. Shea, Southern California Gas Co., sales and advertising section

Frank R. Bater, San Diego Gas & Electric Co., technical section.

AGA Accident Award to NYS Natural

New York State Natural Gas Corp. received the accident prevention award for outstanding accident prevention work at the sixth annual conference sponsored by the accident prevention committee of American Gas Association in September.

HOW EBASCO HELPS THE GAS INDUSTRY

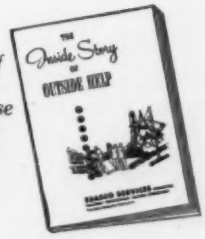
system planning on a long-range basis

With years of background experience in the gas utility industry and the knowledge of probable future developments, Ebasco offers a system planning service to meet the specific needs of all types of gas utilities both large and small.

Ebasco can assist you with your market surveys, load growth forecasts, service requirement studies, present system performance analyses. The relative merits of alternate development plans will be compared and an economic program for the immediate and long-range future will be recommended.

Entire systems from gas field and production facilities to the customer, or the component parts, are covered as may be desired to meet the requirements of the particular situation—including pipe lines, compressor-stations, peak-shaving, conversion, manufactured gas plants, and distribution.

Our booklet—"The Inside Story of Outside Help"—describes Ebasco services and how they may be of use to you. For a copy, write or phone Ebasco Services Incorporated, Dept. S, Two Rector Street, New York 6, N. Y.



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PUBLIC RELATIONS

Continued from page 19

so insufficiently informed about their own industry that they cannot interpret it to the millions of people they meet daily.

JOURNAL: And—what are you going to do about that one?

McDOWELL: We're doing it now! AGA and Edison Electric Institute, through their accounting divisions, have produced the first complete course in customer relations for utility personnel. It includes a supervisor's training manual, 5 sound-slide films, and follow-up booklets for employees. In addition, we're setting up a clearing house for industry employee information programs and initiating a couple of our own as well. We're particularly enthusiastic about an employee information series of short articles in local company house organs.

JOURNAL: You'd put that in the grassroots category, wouldn't you?

McDOWELL: Definitely! Also in the mill at AGA are localized newspaper releases on industry economic and service data, written so that local company and community names can be dropped in.—But I'm afraid I'm spelling this out in a little too much detail. How are we for time or space or whatever mixture of those two ingredients we should be concerned with?

JOURNAL: We're still taking every word, Mr. McDowell. Facts, details—that's what we're after—fire away!

Promoting customer-satisfaction

McDOWELL: Let's see—now we are up to problem no. 3 which is to get stronger efforts that will extend customer and public satisfaction.

JOURNAL: Do you regard that as the real yardstick of the industry's strength?

McDOWELL: Right! Through our public information bureau we're maintaining liaison with editors of food, equipment and shelter magazines. And through our New Freedom Gas Kitchen bureau and other AGA channels under PAR. Next, our full-time industrial and commercial representative places an impressive number of articles in journals that reach local markets, articles that analyze the newest developments and emphasize the vital contributions of gas to the national economy. Then, there are the many newspaper and press association articles originated by AGA on a vast range of subjects.

JOURNAL: Are the activities of AGA's Hollywood bureau included under public information?

McDOWELL: Last year was a good year! The gas industry really was in the movies—gas appliances were shown in 561 TV films and spots, and in 19 major motion pictures.

JOURNAL: How does AGA get important information to what we shall call opinion-forming groups?

McDOWELL: You've pinpointed an important problem there. That's our problem no. 4. Better understanding is needed of the gas industry's basic economic facts-of-life on the part of the public, government agencies and regulatory bodies, business editors and the financial community generally. Channeling significant data to them is of vital importance to us. One of our most important publications—"Gas Facts"—plays a large role in this area of our PR efforts. That yearbook is a mine of important gas industry data for both layman and expert. We distribute thousands of copies of special information pieces such as "Natural Gas—Your Miracle Maker" and "A New Look at the Gas Industry."

Financial relations

JOURNAL: Do you make any particular or specific effort to supply financial editors with facts?

McDOWELL: We certainly do. More than 800 financial and investment houses, banks and insurance companies regularly receive our financial bulletins, statistical and economic fact sheets and booklets, annual reports and news releases. Every year AGA sponsors a get-together of financial people and gas industry leaders. And, we've found that our forums for presenting the gas industry to analysts and investor institutions have been very effective in telling the gas industry story.

JOURNAL: Now, Mr. McDowell, does your list include any more problems?

McDOWELL: Oh, yes—let's see, that brings us to problem no. 5 which is to make millions of American school children aware that gas service and gas appliances are modern.

JOURNAL: What would you call this, planting the seed?

McDOWELL: We could do worse, couldn't we? Well, through the new PAR educational program, AGA, assisted and guided by leading educators, has evolved an impressive list of educational materials for schoolroom presentation. Thousands of kits, "Natural Gas—Science Behind Your Burner," have been distributed to schools.

Realistic views

JOURNAL: Now, Mr. McDowell, in view of all that's being done by AGA, by GAMA, by INGAA and by other industry associations—and in view of all that's been said and written about the urgent need for public relations programs in the gas industry—do you really feel that the potential of such programs is clearly understood in the industry?

McDOWELL: No, I do not. There are still too many comments like "My company is on excellent terms with its employees and customers; we have no public relations problems!" Of course, there are happy exceptions, utilities that are doing outstanding public relations jobs. But, until industry-wide understanding and participation have increased a great deal, the gas industry will continue to lag behind other industries that get the most from their PR possibilities.

JOURNAL: How do you account for that lag?

McDOWELL: I can think of several reasons for it—but—surely one of the big reasons is that we do not have as yet a consistent understanding of just what is meant by public relations.

JOURNAL: By that, do you mean too many people still confuse publicity and public relations?

McDOWELL: That's a part of it, yes. Actually, as you know, publicity is only one element in a well-rounded public relations operation.

JOURNAL: What would be the criterion of effectiveness for a well-rounded operation?

McDOWELL: The degree to which it attains the primary objective we mentioned at the start—to build a better public understanding of the industry through molding favorable opinion.

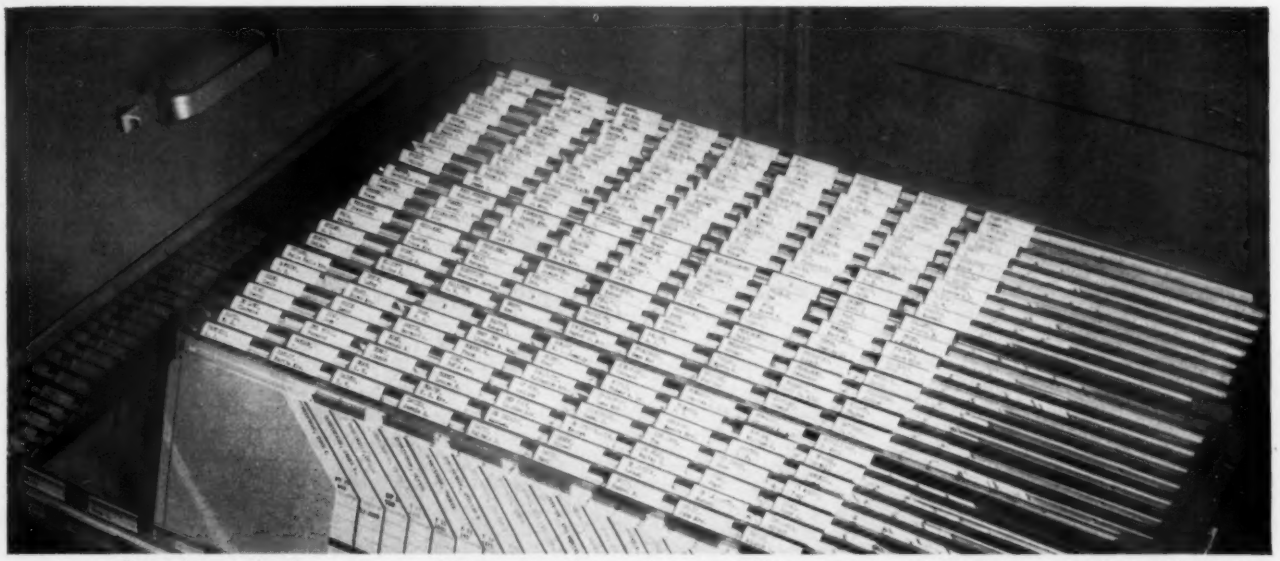
JOURNAL: Who would be in the PR operation, in your view—when and how?

McDOWELL: Who? Everybody—and all the time. An employee's grimace—or smile—at the mention of the company name can and unquestionably will create an outside impression. So will a speech by the president. How? Well, that's broad, too. In every way that an idea can be communicated, I'd say. Of course some judgment will be required to determine just which approach will be used for a particular purpose. That judgment must come from someone in each company who is responsible for public relations. In a small company that person would have other duties, but in a large company the public relations job should be full-time and the responsible person should have a staff assisting him.

JOURNAL: Are you assuming that there is a person in each company in the industry who has been given responsibility for public relations?

McDOWELL: Oh, no—far from it. That's one of the chief weaknesses in the industry's public relations picture. But I am saying flatly, dogmatically—every large gas company should have at least *one* person on its staff who is charged with full-time responsibility for public relations—every small company and all companies between large and small should have that responsibility placed in some one person, even though that person may have to fulfill other duties. And for real effectiveness, of course, the chief officer of any company must understand and value public relations and maintain a direct contact with the person responsible. I think all of us in the gas industry ought to realize that it is only a limited monopoly. Unless we give the public what it wants—good, courteous, honest service at reasonable rates and that, by the way, is in itself a very good definition of public relations—unless we do that, the public will turn to competitive fuels. That's as it should be. And all of us in the industry—producers, transporters, distributors, manufacturers—must realize that it's *together* that we make up the industry. We are not and we cannot be separate and competing provinces—and an adequate public relations program requires that each section of our industry become better acquainted with the problems and goals of the other sections. I'm talking about an integrated public relations program for the entire industry, with distribution, transmission, supply and manufacturing companies working together to tell the complete gas industry story to our employees and our public. And I think the new AGA public relations activities we've briefly discussed here are an essential link in that overall program.

JOURNAL: Thank you, Mr. McDowell.



Open drawer showing panorama of Tampa Gas Company's customer history record cards in their new *VISI*record installation.

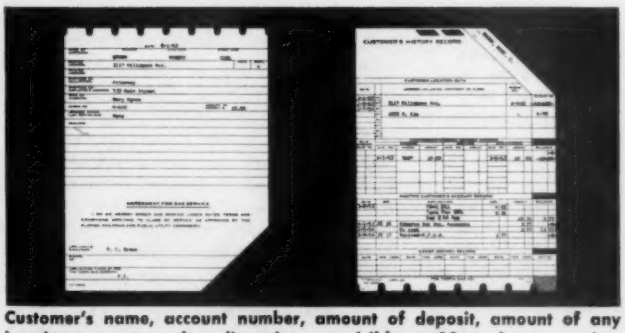
TAMPA GAS CO. INSTALLS *VISI*record IMPROVES CUSTOMER SERVICE — CUTS COSTS!

Condensed from an article that appeared in the May issue of American Gas Journal by Lawrence C. Jewett, Secretary-Treasurer, The Tampa Gas Co.

"In harmony with . . . improving service to the customer and at the same time reducing operating costs, we recently installed a new customer history record designed for use in a visible file and we concurrently streamlined and modernized the related paper work.

"Under the old system (which we had used) both the lack of vital records and the maintenance of several separate and distinct records was costly and time-consuming. Under the new system, these objections are eliminated — the customer's history record card combines into one form:

a. a continuous contract with the customer.
b. customer's index card.
c. a credit history for the customer.
d. a ledger sheet for the customer's service deposit.
e. a ledger sheet for the customer's gas service account when service is disconnected.



Customer's name, account number, amount of deposit, amount of any inactive account, and credit rating are visible on 18 cards at one time in Tampa Gas Company's *VISI*record installation! This speeds up reference, adding and balancing ledger.

Additional major *VISI*record applications for utilities: Accounts Receivable • Inventory Control • Cost Records

Efficient, compact working area of Tampa's *VISI*record installation.

f. a chronological and continuous record of the customer's service showing current location and account number.
g. a bad debt record for the customer.

"One of the finest things about this customer's history record is that it presents a composite and chronological history of the customer's period of service with us.

"It also enables us to process customer applications and order in a hurry, and in so doing with such a complete record, we can check those things which are protective to the company's best interest and do not in any way impair service to the customer.

"Today, almost three months after the change-over (from the old system) began, the . . . employees who use and work with it each day are well pleased with the results. It has enabled them to speed up handling the business of our customers both in the office and over the phone. Compared with the system formerly in use, we have definitely salvaged an appreciable number of manhours, improved the system of internal control and effected some dollar savings by this installation."

VISIrecord, Inc.
Copiague, L. I., N. Y.

TEXAS PIPE

Continued from page 17

speed. The remaining portion of the multiple-furnace line is controlled in 3 zones. The temperature-sensing elements sight directly on the heated and continuously-moving tube. Regulation of furnace operation, from these tube temperature measurements, produces tubing that is uniformly heated, from end-to-end. As a check on tube-temperature, another temperature-sensing element is connected to a recorder and located at the discharge of the last furnace, to provide a temperature record of each tube that passes through the normalizing lines.

The efficiency derived through the use of multiple furnaces, in straight-line operation, controlled in groups, is heightened because each controlled zone functions only at its selected and adjustable maximum capacity when a tube is passing through. During periods when there is no tube in a control zone, minimum gas flow is maintained, automatically, to regulate the desired furnace chamber temperature for the size of tube being processed.

Since the individual furnace chambers are small, the volume of gas required to hold chamber temperature is low compared to conventional furnaces for the same operation. Response to selected maximum fuel demand through the control regulation, when tubes pass the control zone, is rapid because of the compactness of the individual furnaces, and the proximity of the sensing element to the tubing in process.

When a tube production mill is required to operate at reduced capacity, conventional furnaces of the previously-indicated massive design require substantially more fuel per ton of product because of the large radiation losses. As a comparison, the multiple-chamber Gradiation in-line normalizing equipment, under the influence of several control zones, operates with one or more of the entrance zones completely shut off, and the forward tube-speed is reduced when the mill is operating at reduced capacity, holding to a minimum the fuel requirement per ton.

The straight-through normalizing lines, because of design flexibility, can be teamed in speed-pace with maximum mill production; also in thermal-pace with reduced mill production.

Tensile and hardness tests

Figure 5—TESTS, tensile and hardness, were made on electric welded tubing, 4" O.D. x 0.125" wall. For comparison, the tests were made as-welded and after normalizing. The tubing was low carbon, 0.10-0.15%. Note the 2 sets of tests on normalized tubing. Locations of tests are indicated in the sectional drawing, above.

Results

Many months have now elapsed since the gas-fired radiant equipment at Lone Star Steel's mills was first placed in operation and the products have been widely accepted by the purchasers of tubular products.

Tests of tubing, as-welded and after Gradiation normalizing, have shown convincing comparisons that indicate short-cycle normalizing is a practical and economic process in a modern mill.

These mills and the quality of their product are an outstanding example of the results available through coordination of advanced gas combustion techniques, metallurgy and mechanical engineering.

LOCATION	YIELD STRENGTH	ULTIMATE STRENGTH	PER CENT ELONG. IN 2"	ROCKWELL HARDNESS
		AS-WELDED TUBE		
AT WELD	—	—	—	B 84
A	26,750	52,500	32.3	B 66-68
B	27,500	54,570	31.9	B 74-75
C	27,080	54,160	33.5	B 74-76
D	27,270	55,400	32.2	B 71-71
E	30,000	60,000	18.5	B 79-83
		NORMALIZED 1650°F—15 MINUTES		
AT WELD	—	—	—	B 50
A	27,906	45,580	47.3	B 42-45
B	33,460	48,980	43.5	B 49-50
C	34,130	48,940	40.0	B 52-54
D	36,040	49,850	43.5	B 54-57
E	39,080	50,000	45.4	B 48-53
		SELAS SHORT-CYCLE NORMALIZING TREATMENT		
AT WELD	—	—	—	B 59
A	41,430	49,380	44.0	B 48-54
B	41,770	53,100	38.0	B 55-60
C	43,970	53,940	37.0	B 57-61
D	42,110	52,980	37.0	B 55-58
E	43,290	53,600	38.0	B 56-60

FLORIDA COMPANY

Continued from page 15

Gainesville, Fla.	Lakeland, Fla.
Clearwater, Fla.	Daytona Beach, Fla.
Winter Haven, Fla.	Richmond, Va.

The Johnson City installation, in operation since January 1951, was the first commercial reformer used for the production of heating gas. Originally, this unit produced a base load gas interchangeable with a 900 Btu propane-air mix. However, the heat content of the reformed gas was gradually increased to approximately 1,100 Btu prior to the distribution of natural gas. Gradual conversion to 1,100 Btu was handled by the company's service personnel. Final conversion, in March 1954, from reformed gas to natural gas was made successfully with few minor burner adjustments.

The North Miami unit produces a reformed gas from propane with a heat content of 709 Btu that is interchangeable with a 709 Btu oil gas-air mix. An additional reformer is being projected to meet increased peak load requirements.

The reformer operates equally well when using either propane, butane or natural gasoline, and produces a sendout gas varying in heat content from 530 Btu to more than 1,300 Btu.

Only one control, the amount of air inspirated by the injector, is required to change the heat content of the reformed gas over the entire range. When producing a desired sendout gas, the reformer maintains a constant quality, regardless of heat content.

Experience has shown that the reformed gases produced by the reformer, in a range of 530-to-650 Btu, will be interchangeable with the various carburetted water gases. A 1,050-to-1,300 Btu reformed gas will be interchangeable with various natural gases.

Reformed propane, butane, or natural gasoline, with a low specific gravity, are interchangeable with propane air mixes. Reformed gas, interchangeable with oil gas, may also be produced from the above feedstocks. Feed requirements for reformed gas, ranging in heating value from 600-to-1,200 Btu, are shown in Figure 3.

An installation of the Hasche process and LP gas storage facilities also puts the gas company in an excellent position to expand its service area beyond its mains through the distribution of bottled or tank gas. Such an undertaking makes it possible to serve scattered and sparsely settled areas with bottled gas. An extension of the mains can be made when and if such areas grow to warrant the added investment.

DR. R. L. HASCHE, co-author of this article, and Koppers Company, Inc., have entered into an agreement for the sale of the reformers that are described here. The equipment is referred to, interchangeably, as Koppers-Hasche Reformers or Hasche Reformers.

Glasby Mfg Appoints Distributor

J. P. Glasby Mfg. Co., Inc., Belleville, N. J., has appointed Eastern States Supply Corp., Springfield, Mass., as manufacturer's representative and distributor. Eastern States Supply Corp. will serve New England, New York State and Long Island.

FALVEY

Continued from page 21

of utility shares the yield return is nearly twice that which is available from savings accounts. It is difficult to find a group of common stocks meeting the tests of sound economic position and assured growth to a greater extent than in the utility category. The limitation of a ceiling on earnings precludes sensational quick gains, but for stocks in which capital gain possibilities are generally considered subsidiary or minor, and certainly secondary to safety, the group lends itself to the serious consideration of investors, and most assuredly to the holders of large and possibly unwieldy savings accounts.

It is this factor which must be stressed by investment sources to their clients and to the savings account holders who qualify as substantial investors. And it is this same factor which the utility industry should stress in their discussions with the investment quarters who have so much to do with the molding of investor opinion.

TGT Acquires Northeast Subsidiary

Tennessee Gas Transmission Co. has completed acquisition of the properties of its former wholly-owned subsidiary, Northeastern Gas Transmission Co., and is operating them as part of its own natural gas pipeline system.

The action, with Federal Power Commission approval, has resulted in an enlarged Tennessee Gas system. Length of its 2,000-mile pipeline was increased to 2,200 miles.

The Northeastern properties included 533 miles of natural gas pipelines in Massachusetts, Connecticut, New Hampshire and Rhode Island.

Following the Northeastern acquisition, a second similar action was commenced by Tennessee Gas. The boards of directors of Tennessee Gas and its affiliate, Tennessee Production Co., have approved a proposal to merge the production company into the transmission company. Special stockholders' meetings of the two firms have been called for October 6 to vote on the merger.

This second consolidation is expected to be consummated this year. Of the three former major company affiliates, only the Tennessee Life Insurance Co. will continue as a wholly-owned subsidiary.

Mid-West Gas School-Conference Held

The 31st Mid-West gas school and conference, conducted by Mid-West Gas Association and the engineering extension service of Iowa State College, was held September 8 to 10.

Following the call to order by M. K. Wrench, general chairman and first vice president of the association, International Nickel Company's film "corrosion in action" was presented.

Other presentations included: Leak Detection, by Charles D. Peterson, vice president, Universal Controls Corp.; Field Experience on the Use of Plastic Pipe in Distribution Systems, by Robert Bell, sales engineer, Carlon Products Co.; and New Developments in the Field of Venting, by Frank Kohles, Williams Wallace Co.

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Another reason why You can depend on

TAPECOAT®

the Coal Tar Protection in Handy Tape Form

The service behind TAPECOAT is as distinctive as this coal tar coating, itself.

To make this service as dependable as the product, the sales engineer who sells the job also services it. This means that you can count on everything he tells you because he is responsible for the job *personally.*

The fact is, TAPECOAT gives you more lasting protection for your money because it is a quality coal tar product, and coal tar is nature's own defense against corrosion.

Specify TAPECOAT for pipe, pipe joints, tanks, and other vulnerable steel surfaces above or below ground. Its performance record since 1941 merits your complete confidence.

TAPECOAT comes in rolls of 2", 3", 4", 6", 18" and 24" widths. It's easy to apply as our sales engineers will demonstrate.

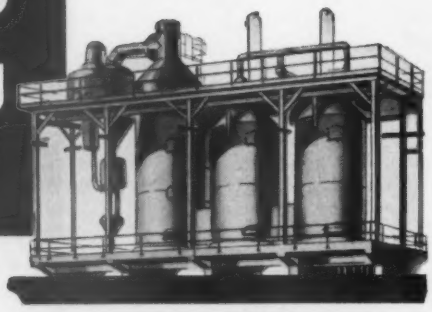
Write for brochure and prices today.

The* TAPECOAT *Company

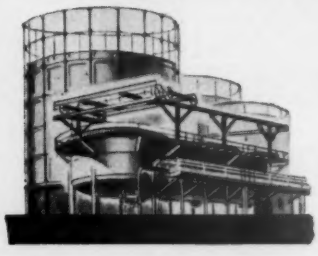
Originators of Coal Tar Tape Protection

1529 Lyons Street, Evanston, Illinois

GASMACO
pioneering *since* 1902

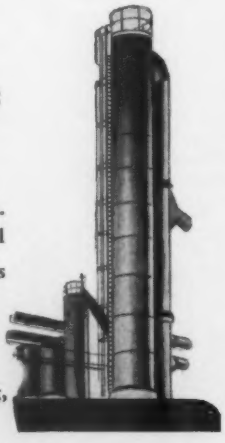


means continuous service and profit to you

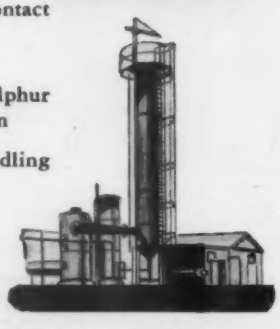


GASMACO has pioneered at least nine major contributions to the gas industry since 1902 comprising new services, new processes, and new equipment.

look at the versatility which GASMACO processes and equipment provide today:



- Low Cost Conversion of Existing Gas Sets to Hi-Btu Oil Gas
- Other Oil Gas Methods for Standby and Peak Shaving, Efficiently Designed for Light or Heavy Oil
- Latest Designs for New and Complete Oil Gas Plants — Base Load or Peak Shaving
- Continuous Gas Generation, Utilizing LPG or Gasoline Feeds
- Water Gas Apparatus, Solid Fuel Bed Reforming, Auxiliary Gas Plant Fixtures
- Gas Cooling — Condensers and Direct Contact Scrubbers — Effluent Decantation and Heat Exchange Systems
- Purification Equipment for Removal of Sulphur Compounds — Low or High Pressure Design
- Oil Scrubbing, Light Oil Recovery, Tar Handling and Other By-Product Methods
- Auxiliary LPG Systems
- Liquefaction, Storage and Regasification of Natural Gas



Consult us first for dependable equipment that supplies greater profit to you and better service to your customers. Your inquiry will receive prompt and competent attention.

THE GAS MACHINERY COMPANY
16114 WATERLOO ROAD
CLEVELAND 10, OHIO

Designers • Fabricators • Erectors
Gas Plant Equipment and Industrial Furnaces
THE GAS MACHINERY CO. (Canada), Ltd.
HAMILTON, ONTARIO

Equitable Gas Activates Storage Pool

Equitable Gas Co. has activated its newest underground storage project, the Logansport pool, located near Mannington, W. V. Constructed at a cost in excess of $2 million, Logansport pool has an estimated ultimate storage capacity of 3 billion cubic feet, and it is anticipated that its peak daily deliverability will exceed 50 million cubic feet.

In preparing the pool for its storage role, 9 existing wells were reconditioned and adapted for storage operations. More than 9 miles of 12" pipeline were constructed to connect the Logansport facilities with Equitable's Pittsburgh supply lines.

The project is part of Equitable's $1.4 million program for development of underground storage facilities during 1954.

Cole Is Pbgh Group Asst Chief Engr

W. D. Cole has been named assistant chief engineer of Manufacturers Light and Heat Co. and other Pittsburgh group companies of Columbia Gas System.

Formerly division engineer for Gulf Interstate Gas Co., Mr. Cole will supervise the gas engineering design, planning, study and research programs of the group companies under the direction of assistant vice president A. B. Lauderbaugh.

Selas Corp Names Sales Zone Head

Robert M. Breckenridge will head the newly-formed St. Louis sales zone of Selas Corporation of America, which was created because of the company's increased activity in the area.

Mr. Breckenridge has been with the company 7 years, where, in a sales engineering capacity, he has participated in the design and engineering of a number of heat processing developments.

Hitz Retires from Central Hudson G&E

G. E. Hitz, executive assistant to the vice president in charge of operations, Central Hudson Gas and Electric Corp., retired on September 1. Mr. Hitz has been associated with Central Hudson for more than 40 years.

NEW GAS APPLIANCES

Water heater

Rated one of the largest gas fired commercial water heaters on the market, this high capacity unit has an input rating of 420,000 Btu/hr and reportedly will produce 403 gals/hr at 100° temperature rise. AGA-approved for use with natural, mixed and manufactured gases, the model is of the reverse flow type with non-ferrous waterways and uses a copper-finned heat exchanger with coiled tubing combustion chamber. Controls include a gas valve, safety pilot and high limit control.

Model 718 Burkay. Permaglas div., A. O. Smith Corp., Milwaukee 1.

Pilot couple

This new pilot couple is an integrally-combined pilot burner and thermocouple. The thermocouple is imbedded in the burner tip and produces electrical current for automatic operation of safety controls.

PC-D. General Controls Co., Glendale, Cal.

AGA in Vehicle Accident Program

The accident prevention committee, general management section, American Gas Association, has worked out a program with National Safety Council to improve motor vehicle accident experience of the industry.

The program, built around the Council's yearly fleet safety contest, is aimed at bringing about a uniformity of statistical information on fleet records of the gas industry and establishment of industry standards to form the basis for analysis and recommendations for corrective action. The program gives the industry a media for exchanging and disseminating current motor vehicle accident experiences.

MEN AT WORK

ROY N. DREIMAN has been named assistant comptroller, *Pacific Gas and Electric Co.*

GEORGE W. HARTUNG has been made assistant treasurer, *The Peoples Natural Gas Co.*

HENRY A. HUBBARD is now sales representative, Dallas area, *American Meter Co.*

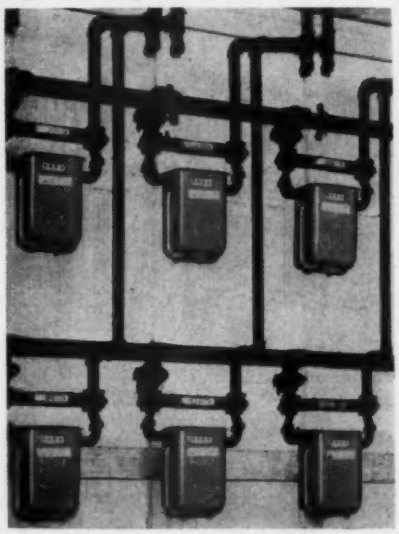
GEORGE MAVES was promoted to manager, Pacific region, *Minneapolis-Honeywell Regulator Co.*

HUGH L. WATHEN is now vice president, sales and public relations, *South Jersey Gas Co.*

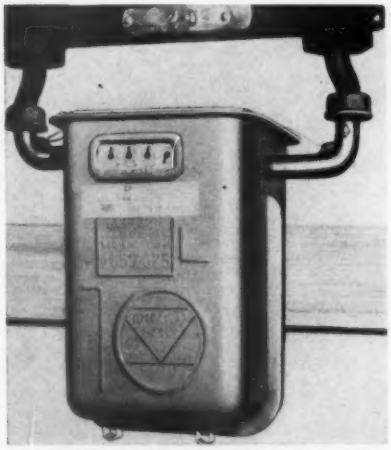
NEW EQUIPMENT

Meter

Designed for many small load applications such as apartment type loads and single dwellings where house heating is



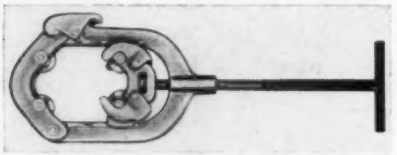
not involved, this small, sturdy meter measures 10¼" by 7-5/16" by 7-5/16". A compact, 60 cfh welded steel unit, the new series is said to offer ample capacity to cover the maximum hourly demand for these loads, yet is low enough in capacity to permit use of the most suitable small valve design to assure accurate measurement of pilot loads. Approximately one-half the size of the manufacturer's standard 5M tinned steelcase meter, the new unit is particularly adaptable to group or bank installations where space is at a premium.



W-60 Series. American Meter Co., Erie, Pa.

Pipe cutter

Offered in several sizes to cover the range from 2½" to 12", this newly designed pipe cutter for large size cast iron or steel pipe features a hinged yoke construction which requires a minimum of digging in ditch work and eliminates "spring" from the tool. Four razor blade wheels speed cutting and serve to reduce the amount of digging in ditch work since the handle swing necessary for complete cutting is only slightly more than 90°. The special design of the cutting wheels rolls down the outside burr on steel pipe and eliminates the need for filing. Wheels for steel or cast iron pipe are quickly interchangeable. Perfect tracking of wheels is



reported, due to the patented, 4-point pipe guide which automatically positions the tool for a right-angle cut. The cutter will cut off 8" steel pipe in less than 5 minutes under typical working conditions.

Hinged Pipe Cutter. Reed Mfg. Co., Erie, Pa.

Temperature regulator

Developed for use on internal combustion engines and other temperature control applications, this temperature regulator has a new-type thermal element and is supplied with 3-way valves. Changed from a liquid or gas-filled thermal element, the new regulator contains a Power-Pill unit charged with a solid, wax-like compound. When subjected to heat the compound melts and expands. The heated liquid returns to a solid state upon cooling. The regulators are insensitive to internal pressures of the system in which they are installed. Repairs, adjustments and parts replacements reportedly can be made without removing the valve from the line. Temperature settings are available in the range

REED TRADEMARK

Announces . . .

. . a revolutionary

New HINGED PIPE CUTTER

You can cut off 8" pipe, in less than 5 minutes

send for free literature on these amazing cutters for standard steel and cast iron pipe from 2½" to 12".

MAIL THIS COUPON TODAY

REED MANUFACTURING CO.
ERIE, PA.

Without obligation, please send me descriptive literature on your new hinged pipe cutters.

Name_____

Company_____

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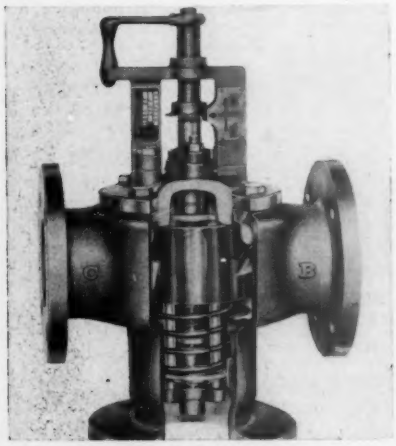
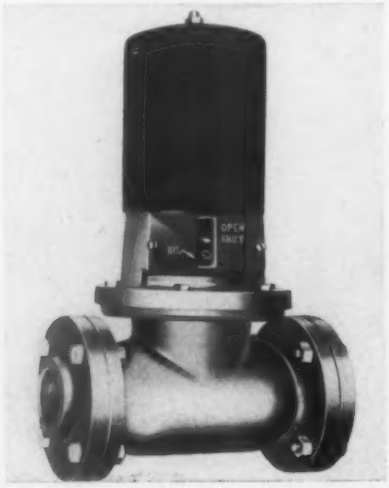
from 120° F to 190° F in 10 to 15 degree increments. All valve bodies are fabricated from bronze with flanged ends.



Nos. 1280-1281. Fulton Sylphon div., Robertshaw-Fulton Controls Co., Box 400, Knoxville, Tenn.

Motorized valve

A new line of motorized valves for automatic fuel control on gas-fired boilers, furnaces, ovens, kilns and other gas combustion systems, the line features 2-wire motor operator, soft neoprene seat construction and sturdy aluminum body. Spring loaded plunger and neoprene seat are said to assure fast, positive shut off in event of electrical failure. Flange mountings, with aluminum companion flanges, are furnished as standard equipment. High capacity, for all commercial fuel gases, the

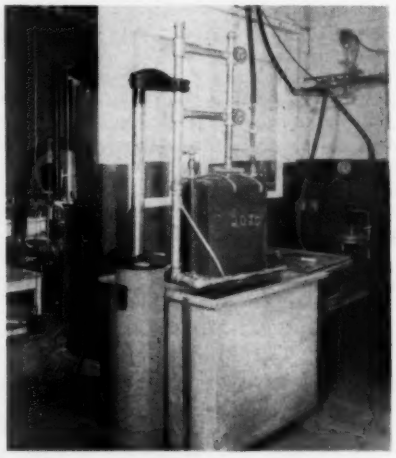


valves are available in 1", 1¼", 1½", 2", 3" and 4" sizes. Open and closed positions of the diaphragm are shown by an indicator on the motor mounting bracket.

Eclipse Fuel Engineering Co., Rockford, Ill.

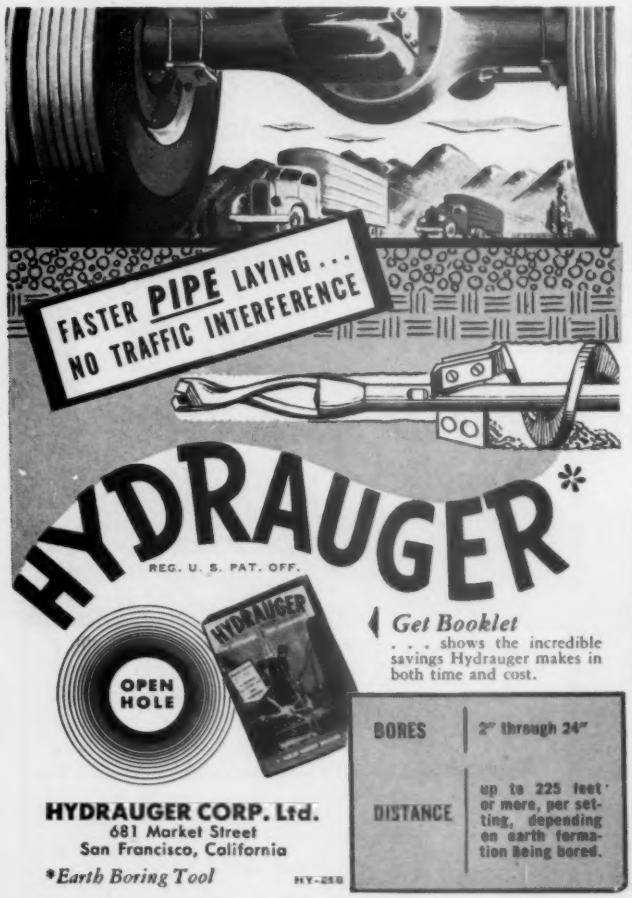
Meter lift

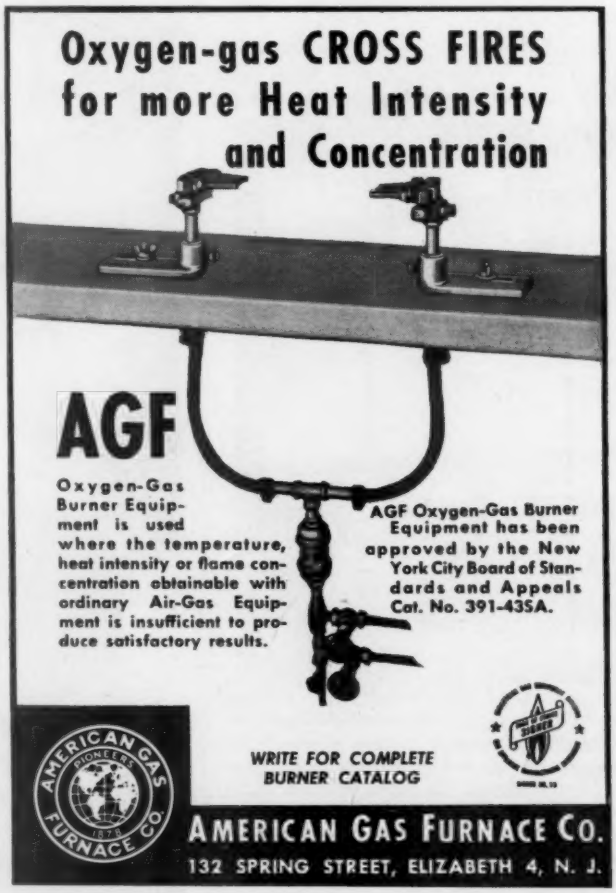
A pneumatic unit developed to lift a gas meter from floor level, position it, lower it and hold it submerged in a testing tank, this unit is said to have proven itself successful in maintenance shop tests with meters up to 60 light size. Operating on any pressure from 50 to 150 lbs., the unit can lift or depress up to 750 lbs. capacity, through a distance of 28". The operator may raise or lower the holding platform with a one-hand safety control, at desired



speed. The control has 3 positions; up, stop and down. Twist type locking pins facilitate quick clamping or releasing of meters when loading or unloading at floor level. The unit is unconditionally guaranteed by the manufacturer. It is 51" high, with a base 13" by 19" and weighs 200 lbs. Lubrication is supplied to valves continuously when the unit is in operation.

Dyna-Lift. Hydraulics Products Co., 509 Westminster St., Providence, R. I.




Oxygen-gas CROSS FIRES for more Heat Intensity and Concentration
AGF
Oxygen-Gas Burner Equipment is used where the temperature, heat intensity or flame concentration obtainable with ordinary Air-Gas Equipment is insufficient to produce satisfactory results.
AGF Oxygen-Gas Burner Equipment has been approved by the New York City Board of Standards and Appeals Cat. No. 391-43SA.
WRITE FOR COMPLETE BURNER CATALOG
AMERICAN GAS FURNACE CO.
132 SPRING STREET, ELIZABETH 4, N. J.

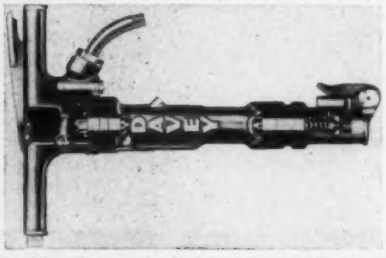
Service saddle

A new style service saddle in a complete line of sizes 2"-12" inside diameter, for tapping asbestos-cement, cast iron and steel pipes, this new saddle is available heavily galvanized or with a special plastic dip. The plastic is non-toxic, does not "plate out" and has dielectric strength. Features include flat straps said to give greater bearing surface on the pipe to prevent cutting or crushing, and rolled threads. Special rubber compound gaskets are cemented in place. They are supplied with either corporation stop thread or inside pipe size thread taps up to 2" in size.

Style 91. Dresser Mfg. div., Bradford, Pa.

Paving breaker

This new light-weight paving breaker for light excavation and demolition work on floors, walls and masonry construction



is said to be particularly adaptable for horizontal trimming and jobs that require breaking to a dimensioned line. Features include a chrome plated cylinder bore, a water plate valve with differential porting to assure positive piston hammer action, a replaceable cylinder bushing that holds the front cushion, metered throttle valve and air-inlet swivel with a ground leak-proof joint and filter screen. A replaceable bronze throttle valve bushing stops air leaks and can be replaced without having to repair the handle. The unit weighs 75 lbs., is 23¼" long, 14¾" wide and has a depth of 4½".

Model DB-35. Davey Compressor Co., Kent, O.

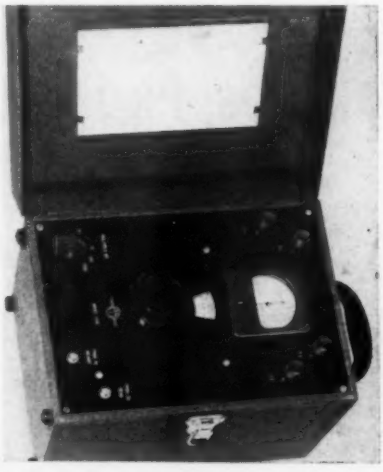
Plastic pipe

A new lightweight flexible plastic pipe, this series is made of 100% virgin polyethylene resin and is guaranteed by the manufacturer to be non-toxic. It is reported that the pipe will not rot, rust or corrode, is easily handled, and requires no special tools to install. Typical applications include cold water systems, farm piping, sewerage and waste, and for conveying industrial chemicals and gases. The company assures immediate delivery of all sizes in the series.

Series 200. Quaker Rubber Corp., div. of H. K. Porter Co., Inc., Philadelphia 24.

Resistivity meter

Developed to permit exploration of the earth's substrata by electrical resistivity methods, this small, self-contained instrument uses the 4 electrode ac fall of potential method and reads resistance directly on a large, dial-type potentiometer calibrated to an accuracy of 1% of full scale. A complete series of resistance ranges from 0 to 4,000 ohms are provided with a new low range of 0-0.4 ohms incorporated for maximum depth penetration. The model em-



ploys a dry-cell battery-operated, vibrator-type power supply. Readings are obtained by balancing a galvanometer type of null detector, and are independent of contact and lead resistance. The unit is in a steel carrying case, 12¼" by 9" by 10", and weighs 20 lbs.

Model 274 Vibroground. Associated Research, Inc., 3758 W. Belmont Ave., Chicago.

IRON SPONGE

for high efficiency gas purification at high pressures

Iron Sponge is your key to sulfur-free gas at minimum processing cost. Iron Sponge has high efficiency at low pressures or at today's high pressures and high temperatures. It absorbs *more* H_2S, gives long service between foulings, and is easily regenerated. Investigate it for your purification problem today!

CONNELLY, Inc.

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Elizabeth, N. J. • Los Angeles, California

THE FIRST REALLY New PIPE FINDER IN 20 YEARS

"Electronic Witch"

LOCATES, with greater depth penetration, exact position of buried pipe. . . . Traces further and more accurately.

The basic "Electronic Witch" unit, complete and ready to operate.

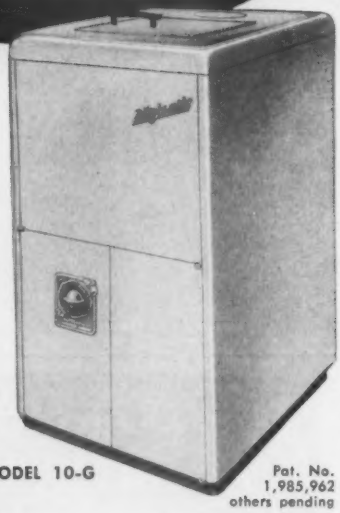
The *"Electronic Witch,"* a really new instrument, will out-perform and outlast any other pipe finder . . . with greater accuracy . . . and with more pronounced indications of buried objects . . . employs completely new electronic circuit . . . sturdy and trouble free. Write *now* for Bulletin H.

JOSEPH G. POLLARD CO., INC.
Pipe Line Equipment
New Hyde Park New York

Twin Appeal

BRINGS PROFITABLE SALES

Majestic DOUBLE-DUTY Gas Incinerator



MODEL 10-G

Pat. No. 1,985,962 others pending

Disposes of both TRASH and GARBAGE

It's easy to sell the extra convenience of modern home disposal methods, and this Majestic appliance provides a double punch for your sales story! Ends both the *garbage and trash* problems through efficient, *downdraft* incineration. Exclusive Majestic features and modern design assure profitable sales and complete customer satisfaction.

DIMENSIONS	20" wide, 24" deep, 36¼" high.
CAPACITY	Two bushels.
FLUE	Requires 7" smoke pipe outlet. May be used with any chimney flue 6" or larger.
BURNER	Monoport, 18,000 BTU rating.
PILOT	Automatic, 1500 BTU rating, dehydrates.
FINISH	Gleaming white enamel over rust-resisting Poly-Kote base.

A Gas Incinerator You Can Recommend With Confidence

—backed by a manufacturer of home incinerators since the 20's

The Majestic Co., Inc.

420-A Erie Street — Huntington, Indiana

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Couplings, Sleeves and Fittings . . .

- Save Time
- Handle Easily
- Give Dependable Service

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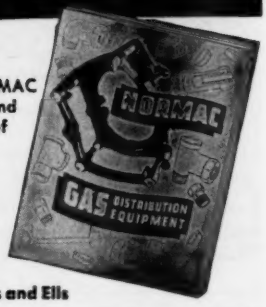
- Maximum Deflection
- Ease of "Stabbing"
- Complete Confinement of Rubber



Today, write for your free copy of this NORMAC catalog . . . complete with illustrations and specifications on the entire Normac Line of Couplings, Sleeves and Fittings. It's a profitable step in the cost-cutting direction.

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Couplings • Meter Bars • Sleeves
Cocks • Ball Joint Clamps • Service Tees and Ells

AMERICAN

Gas Fundamentals

—the continuing educational and refresher course in gas industry techniques, operations and management has been enlarged in scope by the editors of the GAS JOURNAL to provide more-and-more information about the basic functions, responsibilities and practices of every department in a modern gas utility. Also, a wealth of information on gas utilization will be presented in the chapters that are now planned or in preparation.

American Gas Fundamentals is just one more reason why you should have your own copy of the *new* GAS JOURNAL. Uniform 4-page chapters of *Fundamentals* will appear each month, as they have since January 1951.

A FEATURE OF

AMERICAN Gas Journal

NEW BULLETINS

ECLIPSE SOFT METAL REVERBERATORY FURNACES. In the manufacturer's new soft metal reverberatory furnaces described in this bulletin all material is preheated and melted on the sloping hearth at charging door. The bulletin offers information about furnaces with input ratings ranging from 800,000 to 3,400,000 Btu.

Bulletin C-80-T. Eclipse Fuel Engineering Co., 1001 Buchanan St., Rockford, Ill.

SCHIELD BANTAM CRAWLER SHOVEL AND TRUCK-MOUNTED SHOVEL. Two new bulletins containing specifications, capacities and optional equipment for the manufacturers shovel attachment, the first bulletin describes the unit designed for truck-mounting, the second offers identical information for the crawler-mounted shovel-crane. Optional equipment includes electric dipper trip and rehandling buckets.

Bulletins TSH-301 and CSH-301. Shield Bantam Co., Waverly, Ia.

SELAS VAPE-SORBER. The unit described in this bulletin was designed for the continuous removal of petroleum vapor, dirt and liquids from compressed air and other gases, for critical applications. The bulletin offers information on what the unit does and how it works, and provides a descriptive table of facts about three available models. In addition, a page is devoted to the description of other equipment offered by the company for conditioning air or gas. A postal reply card is included in the bulletin so the reader may request information about a unit that will operate under desired conditions.

Bulletin SC-10X3-2. Pp. 4. Selas Corporation of America, Erie Ave. and D St., Philadelphia 34.

THE TYPE GMVA COMPRESSOR UNIT. Comprehensive engineering details of the company's newest engine driven compressor are presented in this bulletin. It shows the latest developments in mechanical scavenging of 2-cycle engines by rotary blower. Cut-away drawings provide complete engine details, installation and operation data. The new model is powered by a 2-cycle engine having 14" bore and 14" stroke. It is built in 4, 6, 8 and 10 cylinders, and develops 540 to 1,350 hp at 300 rpm.

Bulletin 75. Pp. 21. The Cooper-Bessemer Corp., Mount Vernon, O.

LINCOLN SHIELD-ARC ENGINE-DRIVEN WELDERS. This bulletin presents complete information about the manufacturer's line of industrial welders. With dual continuous control the unit provides the right type arc and right arc intensity. Unlimited arc combinations are said to give faster, easier welding in any position; flat, vertical or overhead. Construction details and specifications are given, together with photographs of various applications and schematic views of different type welders.

Bulletin 1337. Pp. 8. The Lincoln Electric Co., Cleveland 17.

HOW FLANGE SURFACE FINISHES AFFECT GASKET SEALABILITY AND JOINT PERFORMANCE. This bulletin provides a basis upon which to select the flange surface finish most suitable for a given gasket. It explains why the right finish makes it easy to achieve an initial seal and obtain the best joint performance in service. For those who buy, specify or design joints in which gaskets are used, the bulletin should prove helpful.

The Gasket—Vol. 1, No. 7. Pp. 12. Johns-Manville, 22 E. 40 St., New York 16.

NORTON REFRACTORIES FOR THE CERAMIC INDUSTRY. This bulletin was prepared as a helpful guide for selection of the most suitable refractory materials for specific applications. In addition to describing the

SUPERIOR
METERS

RESPECTED BY
TWO GENERATIONS
OF METER MEN

★

ALL SIZES
5B TO 75C

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PARTS—REPAIRS
DIAPHRAGMS

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OVER 1,000,000
SUPERIOR METERS
ARE OUR BEST SALESMEN

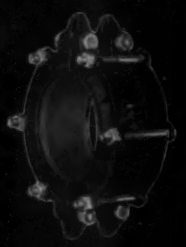
SUPERIOR
METER COMPANY, INC.
167 41st ST., BROOKLYN 32, N.Y.

FOR REPAIRING
BELL AND SPIGOT
JOINT LEAKS...

SKINNER-SEAL
Bell Joint Clamp for stopping bell and spigot joint leaks under pressure. Gasket is completely sealed: at bell face by Monel Metal Seal band — at spigot by hard vulcanized gasket tip. 2" to 42".

AND BROKEN MAINS

SKINNER-SEAL
Split Coupling Clamp. One man can install in 5 to 15 minutes. Gasket sealed by Monel band. Tested to 800 lbs. line pressure. A lasting repair. 2" to 24" incl.



M. B. SKINNER CO.
SOUTH BEND 21, INDIANA, U.S.A.

CRUSE-KEMPER COMPANY
AMBLER, PENNA.

OVER FIFTY YEARS OF SOUND
STEEL PLATE CONSTRUCTION

GAS HOLDERS
Gas Holder Repairs

PURIFIERS
Gas Holder Inspection

available refractory products, the bulletin contains engineering tables and other data useful in connection with the employment of refractories in the ceramic industry. It contains tables with circumferences and areas of circles, international atomic weights, conversion factors and temperature conversion chart.

Pp. 28. Norton Co., Refractories div., Worcester 6, Mass.

CLEVELAND TRENCHER MODEL 240. Many new design and construction features of a full-crawler-mounted wheel-type trencher are described in this bulletin. Copy information about the new model is keyed to a side-view illustration so that locations of the features described are clearly indicated. The bulletin contains a table of the 48 available digging wheel and crawler speed combinations providing over 33 digging speeds ranging from .5 to 37.3 feet per minute and a table of optional digging widths. Complete specifications of the unit are presented, including a dimension drawing.

Bulletin S-119. Pp. 4. The Cleveland Trencher Co., 20100 St. Clair Ave., Cleveland 17.

ECLIPSE SOLENOID VALVES. Design and performance characteristics of the company's line of diaphragm operated solenoid valves are presented in this bulletin. The complete line of valves, in 6 pipe sizes, is illustrated and cross section views show open and closed positions of the valve's 2 moving parts—solenoid plunger and synthetic rubber diaphragm. Specifications cover valve use in control and cycling operations on equipment using air, water, oil, refrigerants, natural, manufactured, propane and butane fuel gases, sulphur dioxide and other non-corrosive gases. Electrical characteristics and materials of construction are described.

Bulletin M-500. Pp. 4. Eclipse Fuel Engineering Co., 1012 Buchanan St., Rockford, Ill.

TITEFLEX QUICK-SEAL COUPLING. This new bulletin describes construction of the company's quick-seal hose coupling for gas lines and points out how construction provides: a sealing action which is said to make the coupling tighter as internal pressure increases, thereby insuring freedom from leakage; a full swiveling action that prevents hose twisting and kinking. The bulletin describes the couplings as hose connections available in an unlimited range of sizes to handle any material that will flow through a line. Also presented are single- and double-check valve modifications of the coupling which permit disconnecting lines without shut-down and which prevent fluid escape when lines are opened. Accessories such as right-angle connections are also covered.

Pp. 16. Industrial Sales, Titeflex, Inc., Hendee St., Springfield 4, Mass.

WHEELCO CAPACITROLS FOR DIRECT READING TEMPERATURE CONTROL. A new series of capacitrols designed for accurate indicating and instantaneous control in the process industries is described in this bulletin. The instrument uses plug-in components, with both temperature measuring system and control chassis of plug-in design. The bulletin describes design simplicity, capacitrol accuracy and control. Schematic illustrations are included, along with specifications.

Bulletin F-5358-1. Pp. 2. Wheelco Instruments div., Barber-Colman Co., Rockford, Ill.

CHIKSAN CATALOG. This 32-page catalog covers the manufacturer's complete line of ball-bearing swivel joints and other products including loading racks and manifolding lines. In addition to providing dimensional and operating data, typical industrial applications are illustrated. The ball-bearing swivel joints described include models designed for low pressure, high pressure, extra high pressure and high temperature, of malleable iron, steel, stainless steel, aluminum, or nickel-bronze for pressures from 125 psi to maximum cold working pressure of 15,000 psi. The joints, with single, 2 or 3 swivels, turn with full 360° rotations in 1, 2 and 3 planes, handling air, hydraulics, fuels, oils, water and other fluids. The bulletin presents information including general description of the joints, basic types, basic styles, industrial applications and special swivel joints.

Catalog G-4. Pp. 32. Chiksan Co., Brea, Cal.

THE MODERN SELF-CONTAINED CB BOILER. This bulletin describes the company's new line of small boilers available in 50, 60, 70 and 80 hp., 15 to 150 lbs. steam or 30 lbs. hot water, for heating and processing. The illustrated bulletin contains complete information about boiler features including

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Bulletin AD-135. Pp. 4. Cleaver-Brooks Co., 326 E. Keefe Ave., Milwaukee 12.

WHEELCO 400 SERIES CAPACITROLS. Features of the company's new series of electronic controllers are described in this bulletin. Available in many control forms, the completely self-contained, direct deflection, indicating controller is adaptable to a multitude of process applications. The unit series can be used for such applications as indicating and controlling voltages, current, speed and similar variables.

Pp. 4. Wheelco Instruments Div., Barber-Colman Co., Rockford, Ill.

ECLIPSE AIR-GAS PROPORTIONAL MIXERS and ECLIPSE VALVES. Two new bulletins have been issued by the company; one describing the complete line of proportional mixers, the other describing valves for combustion control. The bulletin on proportional mixers presents information on the importance of correct air-gas ratio, methods of mixing air and gas for combustion, and summary information on the various units available. The bulletin on valves contains information on cocks, blast gates and governors for combustion control.

Bulletins L and M. Eclipse Fuel Engineering Co., Rockford, Ill.

NATURAL GAS MONITORING. The costly effects of air in gas lines are described in this new bulletin. A pipeline monitoring system is illustrated in the bulletin and its required equipment is listed. The bulletin points out that by continuously measuring the amount of oxygen in a system, danger of explosion and loss due to pipeline deterioration can be avoided and the heating value of the gas maintained at proper standards.

Bulletin AD-612. Arnold O. Beckman, Inc., 1020 Mission St., South Pasadena, Cal.

BAILEY METERS AND CONTROLS. Instrumentation for the modern process plant is presented in this bulletin. Detailed equipment descriptions and illustrations include basic specifications for measuring, transmitting, receiving, interpreting, and controlling 18 variables normally encountered in production processes.

Bulletin 17-F. Pp. 16. Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10.

NEW BOOKS

PRINCIPLES OF ENGINEERING THERMODYNAMICS. By Paul J. Kiefer, Gilbert Ford Kinney and Milton C. Stuart.

A second edition, this book has been almost completely rewritten and provides an effective presentation of material specifically designed to serve requirements of the engineer. It covers the thermodynamic basis of fluid mechanics and dynamics, unifying the mechanical, chemical, and dynamic applications and making them suitable for current engineering practice. The book presents a basic and comprehensive analysis of those aspects of thermodynamics which are required in the design and operation of power machines. In this new edition the conventional steady-flow energy equation is supplemented by a parallel equation of mechanical antecedents; the thermodynamic properties of ideal gases are developed and facilities furnished so that specific heat variation is provided for in process analysis, and facilities are developed enabling ready correlation of the properties and analysis of typical processes with non-ideal high pressure gases.

Pp. 539 + xv. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. $7.75.

GAS FACTS. By American Gas Association Bureau of Statistics.

The statistical yearbook of the association, this eighth annual edition presents all available information and pertinent quantitative data relating to reserves, production, transmission, distribution and underground storage of gas. The scope of data relating to natural gas production and exploration, and to the composite financial experience of the gas utility has been increased in this edition, whereas statistics relating to the production of manufactured, mixed and LP gas have been de-emphasized. There are chapters covering customers, sales, revenues, financial results, construction expenditures, employees and prices.

Pp. 276 xiv. Bureau of Statistics, American Gas Association, 420 Lexington Ave., New York 17. First 5 copies, $2.00 each; additional copies, $1.50 each.

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GAS INDUSTRY CALENDAR

October

9 AGA board of directors, Atlantic City, N. J.
11-13 AGA annual convention, Atlantic City, N. J.
18-22 National Safety Council, Chicago.

November

1-5 National Metal Exposition, Chicago.
4 Midwest Industrial Gas Council, fall meeting, La Salle Hotel, Chicago.
8-11 American Petroleum Institute, Conrad Hilton Hotel, Chicago.
8-12 National hotel exposition, Kingsbridge Armory, New York.
17-19 Wisconsin Utilities Association, gas and electric sections convention, Schroeder Hotel, Milwaukee, Wis.
17-19 Southeastern Gas Association, Sir Walter Hotel, Raleigh, N. C.
28-December 3 The American Society of Mechanical Engineers, Statler Hotel, New York.

December

6-7 SGA advisory council and management conference, Point Clear, Ala.

January, 1955

13-20 National housewares & home appliance exhibits, Navy Pier, Chicago.
16-20 National Association of Home Builders convention, Conrad Hilton Hotel, Chicago.
24-25 Industrial Furnace Manufacturers Association, Inc., Sheraton-Cadillac Hotel, Detroit.
28 Pennsylvania Gas Association, mid-winter sales conference, Benjamin Franklin Hotel, Philadelphia.

February, 1955

7-11 Western winter radio-television and appliance market, Western Merchandise Mart, San Francisco.
13-15 Mid-winter conference, public utility buyers, National Association Purchasing Agents, The Shamrock, Houston.

March, 1955

7-9 Mid-West Gas Association, St. Paul Hotel, St. Paul, Minn.
24-25 Oklahoma Utilities Association convention, Mayo Hotel, Tulsa, Okla.
24-25 New England Gas Association, annual meeting, Hotel Statler, Boston, Mass.

April, 1955

12-14 AGA sales conference on Industrial and commercial gas, Hotel Statler, Boston, Mass.
12-15 AGA distribution, motor vehicles and corrosion conference, Netherland Plaza, Cincinnati, O.
19-21 Southwestern gas measurement short course, University of Oklahoma, Norman, Okla.
20-22 Indiana Gas Association, annual meeting, French Lick Springs Hotel, French Lick, Ind.
25-27 Mid-West regional gas sales conference, Edgewater Beach Hotel, Chicago.

May, 1955

1-4 LPGA annual convention, Conrad Hilton Hotel, Chicago.
2-6 AGA industrial gas school, Wm. Penn Hotel, Pittsburgh.
9-10 AGA gas supply, transmission and storage conference, Wm. Penn Hotel, Pittsburgh.
9-13 National restaurant exposition, Navy Pier, Chicago.
16-18 Southern Gas Association, New Orleans, La.
17-19 Pennsylvania Gas Association, Pocono Manor Inn, Pocono Manor, Pa.
23-25 GAMA annual meeting, Ambassador Hotel, Los Angeles.
23-25 AGA chemical, engineering and manufactured gas production conference, Hotel New Yorker, New York.

June, 1955

5-9 Canadian Gas Association, annual meeting, General Brock Hotel, Niagara Falls, Ontario, Canada.
9-10 Natural Gas and Petroleum Association of Canada, Royal Connaught Hotel, Hamilton, Ontario, Canada.
26-29 Michigan Gas Association, Grand Hotel, Mackinac Island, Mich.

July, 1955

18-22 Western summer radio-television and appliance market, Western Merchandise Mart, San Francisco.

September, 1955

7-9 Mid-West Gas Association, gas school and conference, Iowa State College, Ames, Ia.
9 New Jersey Gas Association, Hotel Monmouth, Spring Lake, N. J.
27-30 International Gas Union 6th conference, Hotel New Yorker, New York.

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